

APS/URSI 2004 Advance Program

Session 1. Reflect Array and Reflector Antennas

Monday, June 21 7:55-11:40

AP

San Carlos I

Co-Chairs: Stephen Targonski, *MIT Lincoln Laboratory, USA*
Andrew F. Peterson, *Georgia Institute of Technology, USA*

- 7:55 Opening Remarks
- 8:00 1.1 **An Interpolation/Perturbation Approach for the Modeling of Reflectarray Elements**
M. Bozzi, L. Perregrini, University of Pavia, Italy
- 8:20 1.2 **A Folded 3-Layer Printed Reflectarray with Shaped Pattern for LMDS Central Station Sectored Antenna**
J. A. Zornoza¹, R. Leberer², M. Moraga¹, J. A. Encinar¹, W. Menzel²
¹Universidad Politécnica de Madrid, Spain; ²Universität Ulm, Germany
- 8:40 1.3 **Experimental Validation of Genetically Optimized Microstrip Reflectarray**
M. Mussetta¹, P. Pirinoli², G. Dassano², R. E. Zich¹, M. Orefice²
¹Politecnico di Milano, Italy; ²Politecnico di Torino, Italy
- 9:00 1.4 **Optimization of the Polarization of Reflectarrays Using Characteristic Modes**
M. Cabedo-Fabres, E. Antonino-Daviu, A. valero-Nogueira, M. Ferrando-Bataller, Universidad Politecnica de Valencia, Spain
- 9:20 1.5 **Printed Reflectarrays as Versatile Solution for Multibeam Applications**
F. Venneri, S. Costanzo, G. Di Massa, University of Calabria, Italy
- 9:40 1.6 **Experimental Results for a Focal Plane Array, Synthesized with Conjugate Field Method**
M. V. Ivashina¹, J. D. Bregman¹, J. G. bij de Vaate¹, L. Li², A. Parfitt³, W. van Cappellen¹
¹ASTRON Institute, The Netherlands; ²CSIRO Telecommunications & Industrial Physics, Australia; ³Cooperative Research Centre for Satellite Systems, Australia
- 10:00 1.7 **Beam Scanning Technique for Multibeam Circularly-Polarized Reflector Antennas**
M. A. Terada, M. Funk, New Mexico State University, USA
- 10:20 1.8 **Feed Array Design for Rotationally Symmetric Reflector Antenna with Sector Beams**
J. A. Martinez-Lorenzo, A. Garcia-Pino, M. Arias, O. Rubíños, University of Vigo, Spain
- 10:40 1.9 **A Mesh Reflecting Surface with Electrical Characteristics Independent on Direction of Electric Field of Incident Wave**
A. Miura, M. Tanaka, Communications Research Laboratory, Japan
- 11:00 1.10 **Fast Analysis of Electromagnetic Radiation/Scattering from Large Reflector Antennas with Tapered Impedance Surfaces by a Hybrid Scheme of Gaussian Beam and Physical Optics Techniques**
S.-C. Tuan, Kuang-Wu Inst. of Tech., Taiwan; H.-T. Chou, Yuan Ze University, Taiwan
- 11:20 1.11 **A Hierarchical Aperture Decomposition Approach to Fast Analysis of Lens and Reflector Antennas**
A. Boag, Tel Aviv University, Israel; C. Letrou, INT/GET, France

Session 2. New Developments in the FDTD Methods

Monday, June 21 7:55-12:00

AP

San Carlos II

Co-Chairs: Fernando Teixeira, *The Ohio State University, USA*
Ji Chen, *University of Houston, USA*

- 7:55 Opening Remarks
- 8:00 2.1 **Truely High Order FDTD Method for Inhomogeneous Electromagnetic Media**
S. Zhao, G. Wei, Michigan State University, USA
- 8:20 2.2 **Comparison Between Two Stable Hybridized Generalized 2D FDTD Algorithms for Multiscale Analysis**
M. Marrone, R. Mittra, Pennsylvania State University, USA

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| 8:40 | 2.3 | Time Domain Support Operator Method on Unstructured Grids <u>Y. Liu</u> , W. C. Chew, <i>University of Illinois at Urbana-Champaign, USA</i> |
| 9:00 | 2.4 | Symmetric Source Implementation for ADI-FDTD <u>B. Donderici</u> , F. L. Teixeira, <i>Ohio State University, USA</i> |
| 9:20 | 2.5 | Subgridding with Domain Overriding for FDTD <u>B. Donderici</u> , F. L. Teixeira, <i>Ohio State University, USA</i> |
| 9:40 | 2.6 | On the Effect of Total Reflection on Subgridded FDTD Meshes <u>M. Celuch-Marcysiak</u> , J. Rudnicki, <i>Warsaw University of Technology, Poland</i> |
| 10:00 | 2.7 | The ADI-FDTD Algorithm for Planar Circuits Containing Passive and Active Elements <u>W.-Y. Wu</u> , C.-W. Kuo, <i>National Sun Yat-Sen University, Taiwan</i> |
| 10:20 | 2.8 | Novel FDTD Approach for the Analysis of Chiral Cylinders <u>A. Semichaevsky</u> , A. Akyurtlu, <i>University of Massachusetts Lowell, USA</i> ; D. Kern, D. H. Werner, <i>Pennsylvania State University, USA</i> |
| 10:40 | 2.9 | Hardware Acceleration of the 3D Finite-Difference Time-Domain Method <u>J. P. Durbano</u> , <i>EM Photonics, Inc., USA</i> ; J. R. Humphrey, F. E. Ortiz, P. F. Curt, D. W. Prather, <i>University of Delaware, USA</i> ; M. S. Mirotznik, <i>The Catholic University of America, USA</i> |
| 11:00 | 2.10 | Narrow Strip above Ground Plane Transmission Line Formulation in the FDTD Algorithm <u>B. Koh</u> , <u>C. J. Railton</u> , I. J. Craddock, <i>University of Bristol, UK</i> |
| 11:20 | 2.11 | A Novel Algorithm of High Order SIBC for the FDTD <u>H.-X. Zheng</u> , <i>Tianjin University, China</i> |
| 11:40 | 2.12 | The Simple Derivation for the Effective Permittivities Formulae in the Finite Difference Grids <u>X. Bao</u> , Z. Li, <i>Shanghai Jiaotong University, China</i> ; X. Sun, <i>The Chinese Academy of Science, China</i> |

Session 3. RFID & Wearable Antennas

Monday, June 21 7:55-10:00

AP

San Carlos III

Chair: Koichi Ito, *Chiba University, Japan*

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| 7:55 | | Opening Remarks |
| 8:00 | 3.1 | Patch Antenna with EBG Ground Plane and Two-Layer Substrate for Passive RFID of Metallic Objects <u>L. Ukkonen</u> , L. Sydänheimo, M. Kivikoski, <i>Tampere University of Technology, Finland</i> |
| 8:20 | 3.2 | A Folded Dipole Antenna for RFID <u>X. Qing</u> , N. Yang, <i>Institute for Infocomm Research, Singapore</i> |
| 8:40 | 3.3 | Planar Wire-Type Inverted-F RFID Tag Antenna Mountable on Metallic Objects <u>L. Ukkonen</u> ¹ , D. Engels ² , L. Sydänheimo ¹ , M. Kivikoski ¹ ¹ <i>Tampere University of Technology, Finland</i> ; ² <i>Massachusetts Institute of Technology, USA</i> |
| 9:00 | 3.4 | Evaluation of the Received Signal Level in Relation to the Size and Carrier Frequencies of the Wearable Device Using Human Body as a Transmission Channel <u>K. Fujii</u> , K. Ito, <i>Chiba University, Japan</i> |
| 9:20 | 3.5 | Dual-Polarized Probe-Fed Patch Antenna with Highly Decoupled Ports for WLAN Base Station <u>F. S. Chang</u> , <u>H. T. Chen</u> , <i>Military Academy, Taiwan</i> ; K. C. Chao, <i>Cheng Shiu University, Taiwan</i> ; K. L. Wong, <i>National Sun Yat-Sen University, Taiwan</i> |
| 9:40 | 3.6 | Wave Propagation in Planar Antennas at THz Frequencies <u>F. J. Gonzalez</u> , G. Almpantis, B. A. Lail, G. D. Boreman, <i>University of Central Florida, USA</i> |

Session 4. Patch and Slot Antenna Array-Analysis

Monday, June 21 7:55-12:00

AP

San Carlos IV

Co-Chairs: Paolo Grassi, *University of Pisa, Italy*
Yasuo Kuga, *University of Washington, USA*

- 7:55 Opening Remarks
- 8:00 4.1 **Analysis of Cylindrical Circumferential Array with Circular Polarization for Space Applications**
M. V. T. Heckler, *German Aerospace Center (DLR), Germany*; M. Bonadiman, J. C. D. S. Lacava, *Technological Institute of Aeronautics, Brazil*; L. Cividanes, *Brazilian Institute for Space Research, Brazil*
- 8:20 4.2 **A Discussion on the Characteristic Mode Theory Limitations and Its Improvement for the Effective Modeling of Antennas and Arrays**
M. Cabedo-Fabres, A. valero-Nogueira, J. I. Herranz-Herruzo, M. Ferrando-Bataller, *Universidad Politecnica de Valencia, Spain*
- 8:40 4.3 **Characterization of Finite Waveguide Arrays Using a New Generalized Scattering Matrix Approach**
P. Grassi¹, R. Mittra², A. Monorchio¹, G. Manara¹
¹*University of Pisa, Italy*; ²*Pennsylvania State Univ., USA*
- 9:00 4.4 **Analysis of Planar Slotted-Waveguide Array Antennas with Longitudinal Slots Using the Method of Moments**
A. Bastani, *Columbia University, USA*; J. Rashed-Mohassel, *University of Tehran, Iran*
- 9:20 4.5 **G/T of a Multi-Segment Active Array - Dependence on Array Configuration**
D. Busuioc, M. Shahabadi, A. Borji, S. Safavi-Naeini, *University of Waterloo, Canada*
- 9:40 4.6 **Synthesis of Nonuniformly Spaced Linear Array for GSM/DCS/WCDMA Base Station Application Using Genetic Algorithm**
A.-S. Liu, R.-B. Wu, Y.-C. Lin, H.-J. Li, *Graduate Institute of Communication Engineering, National Taiwan University, Taiwan*
- 10:00 4.7 **A Simple Method of Reducing Grating Lobes**
N. Toyama, *The University of Electro-Communications, Japan*
- 10:20 4.8 **Sequential Rotation in a Smart Antenna Terminal for Broadband Communication**
M. Thiel, A. Dreher, *German Aerospace Center (DLR), Germany*
- 10:40 4.9 **A Novel Frequency-Fixed Dual-Beam Scanning Microstrip Leaky-Wave Antenna**
Y. Li, H. Jiang, Y. Long, *Sun Yat-Sen University, China*
- 11:00 4.10 **Coupling Estimation and Compensation Model for Arrays of Multimode Radiators**
J. L. Masa Campos, J. M. Fernández Gonzalez, M. Sierra Castañer, M. Sierra Pérez, *Universidad Politécnica de Madrid, Spain*
- 11:20 4.11 **Modeling of Two-Dimensional Periodic Arrays Using Iterative Method**
H. Zairi, A. Gharsallah, *Faculty of Science, Tunisia*; L. Desclos, *IRCCYN, France*; H. Baydrand, *ENSEEIHT, France*
- 11:40 4.12 **Mechanically Steerable Antennas Using Dielectric Phase Shifters**
Y. Kuga, J. Cha, J. A. Ritcey, *University of Washington, USA*; J. T. Kajiya, *Microsoft Corporation, USA*

Session 5. Antennas for Airborne & Space Applications

Monday, June 21 7:55-10:00

AP

Ferrante III

Co-Chairs: Michael C. Buck, *University of Colorado, USA*
Glenn Hopkins, *Georgia Tech Research Institute, USA*

- 7:55 Opening Remarks
- 8:00 5.1 **Multiband Two Arm Slot Sinuous Antenna**
M. C. Buck¹, J. Burford², D. S. Filipovic¹
¹*University of Colorado, USA*; ²*Lockheed Martin, USA*

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| 8:20 | 5.2 | Multiband Antenna for Airborne Satellite Communications <u>G. Hopkins</u> , V. Tripp, J. Leverett, G. Hampton, <i>Georgia Tech Research Institute, USA</i> |
| 8:40 | 5.3 | Radiation Characteristics of Small Antennas on Small UAV Platform <u>E. C. Ngai</u> , A. J. Fenn, A. K. Eapen, <i>MIT Lincoln Laboratory, USA</i> ; E. H. Newman, <i>The Ohio State University, USA</i> |
| 9:00 | 5.4 | Detection and Localization of L-Band Satellites Using an Antenna Array <u>S. W. Ellingson</u> , <i>Virginia Polytechnic Institute & State University, USA</i> ; G. A. Hampson, <i>The Ohio State University, USA</i> |
| 9:20 | 5.5 | Modelling of Antenna Radiation Pattern of a Re-Entry Vehicle in Presence of Plasma <u>G. Vecchi</u> ¹ , M. Sabbadini ² , R. Maggiora ¹ , A. Siciliano ¹ ¹ <i>Polytechnic of Turin, Italy</i> ; ² <i>ESA-ESTEC, Netherlands</i> |
| 9:40 | 5.6 | Electromagnetic Analysis for Vehicle Antenna Development Using Method of Auxiliary Sources <u>R. S. Zaridze</u> , D. G. Kakulia, K. N. Tavzashvili, G. N. Ghvedashvili, <i>Tbilisi State University, Georgia</i> ; D. P. Pommerenke, X. Xiao, <i>University of Missouri, USA</i> |

Session 6. Inverse Scattering (of Complex Targets and Environments)

Monday, June 21 7:55-11:20

AP

Ferrante II

Co-Chairs: Qing Liu, *Duke University, USA*
David Chambers, *Lawrence Livermore National Laboratory, USA*

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| 7:55 | | Opening Remarks |
| 8:00 | 6.1 | High-Order Inversion Formulas for Low-Frequency Imaging of 2D Buried Targets <u>T. J. Cui</u> , Y. Qin, <i>Southeast University, China</i> ; G. L. Wang, W. C. Chew, <i>University of Illinois at Urbana-Champaign, USA</i> |
| 8:20 | 6.2 | Three-Dimensional Reconstruction of Objects Buried in Layered Media <u>F. Li</u> , Q. H. Liu, L.-P. Song, <i>Duke University, USA</i> |
| 8:40 | 6.3 | 3D Nonlinear Electromagnetic Inversion for Buried Objects in Layered Media <u>L.-P. Song</u> , Q. H. Liu, F. Li, <i>Duke University, USA</i> |
| 9:00 | 6.4 | Image Reconstruction of Objects Buried in the Lossy Half-Space with Hybrid Integral Formulation <u>M. Li</u> , C.-C. Lu, <i>University of Kentucky, USA</i> |
| 9:20 | 6.5 | Inverse Scattering Computational Algorithm for the Reconstruction of Random Rough Surface Profiles <u>M. El-Shenawee</u> , <i>University of Arkansas, USA</i> ; E. Miller, <i>Northeastern University, USA</i> |
| 9:40 | 6.6 | An Efficient Optimization Method for the Reconstruction of Multiple Profiles <u>F. Seydou</u> , T. Seppanen, O. M. Ramahi, <i>University of Oulu, Finland</i> |
| 10:00 | 6.7 | A Generalized Neural Network to Inverse Scattering from Cylindrical Conducting Targets <u>A. H. Atabaki</u> , <u>K. Barkeshli</u> , <i>Sharif University of Technology, Iran</i> |
| 10:20 | 6.8 | Effective Scatterer Localisation in the Circular Scanning Geometry <u>O. M. Bucci</u> , A. Capozzoli, <u>G. D'Elia</u> , M. Santojanni, <i>Università di Napoli Federico II, Italy</i> |
| 10:40 | 6.9 | Microwave Imaging of Perfect Electrically Conducting Cylinder by Micro-Genetic Algorithm <u>T. Huang</u> , A. S. Mohan, <i>University of Technology, Sydney (UTS), Australia</i> |

Session 7. Dielectric Measurements and Sensors

Monday, June 21 7:55-10:00

AP/URSI A: Joint Special Session

Ferrante I

Organizers: Samir Trabelsi, *U. S. Dept. of Agriculture, USA*
Omar Ramahi, *University of Maryland, USA*

Co-Chairs: Samir Trabelsi, *U. S. Dept. of Agriculture, USA*
Omar Ramahi, *University of Maryland, USA*

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| 7:55 | Opening Remarks | |
| 8:00 | 7.1 | An Experimental Setup for the Microwave Imaging of Inhomogeneous Dielectric Bodies M. J. Akhtar, <i>Forschungszentrum Karlsruhe GmbH, Germany</i> ; N. G. Spiliotis, A. S. Omar, <i>University of Magdeburg, Germany</i> |
| 8:20 | 7.2 | Permittivity and Density Relationships for Granular and Powdered Materials S. O. Nelson, <i>U. S. Department of Agriculture, USA</i> |
| 8:40 | 7.3 | Dielectric Spectroscopy of Breast Tissue at Microwave Frequencies: A Review of Recent Progress S. C. Hagness ¹ , C. Beasley ¹ , M. Lazebnik ¹ , M. Converse ¹ , J. Booske ¹ , M. Okoniewski ² , D. Popovic ² , L. McCartney ² , T. M. Breslin ¹ , J. Harter ¹ , S. Sewall ¹ , M. J. Lindstrom ¹ , W. Temple ² , D. Mew ² , A. Magliocco ² , T. Ogilvie ² ¹ <i>University of Wisconsin-Madison, USA</i> ; ² <i>University of Calgary, Canada</i> |
| 9:00 | 7.4 | Probes for the Measurement of the Dielectric and Magnetic Properties of Building Materials J. R. Baker-Jarvis, R. G. Geyer, <i>NIST, USA</i> |
| 9:20 | 7.5 | Accurate Broad-Band Measurement of Complex Permittivity M. El Sabbagh ¹ , M. H. Kermani ^{2,2} , O. M. Ramahi ^{2,2,2} ¹ <i>Ain Shams University, Egypt</i> ; ² <i>University of Maryland, USA</i> |
| 9:40 | 7.6 | Investigating Measurements of the Dielectric Properties of Granular Materials with Microstrip Antennas S. Trabelsi, <i>The University of Georgia, USA</i> ; S. O. Nelson, <i>Agricultural Research Service-USDA, USA</i> |

Session 8. Array Design and Analysis

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| Monday, June 21 7:55-10:00 | URSI B | Colton |
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Co-Chairs: Vakur Erturk, *Bilkent University, Turkey*
William Davis, *Virginia Polytechnic Institute and State University, USA*

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| 7:55 | Opening Remarks | |
| 8:00 | 8.1 | Scan Blindness of Conformal Phased Arrays of Printed Dipoles V. B. Erturk ¹ , R. G. Rojas ² , B. Guner ¹ ¹ <i>Bilkent University, Turkey</i> ; ² <i>The Ohio State University, USA</i> |
| 8:20 | 8.2 | Scanning Properties in Fracton-Mode Microstrip Arrays Using Elements Inspired on the Sierpinski Fractal J. Anguera, <i>Fractus-Korea, Korea</i> ; S. Prieto, C. Puente, C. Borja, J. Soler, <i>Fractus-Spain, Spain</i> |
| 8:40 | 8.3 | Impedance Bandwidth Characterization of Highly Coupled Antenna Arrays Using Scattering Parameter Network Models K. Takamizawa, W. A. Davis, W. L. Stutzman, <i>Virginia Polytechnic Institute and State University, USA</i> |
| 9:00 | 8.4 | A Method of Array Pattern Synthesis by Phase Control R. Vescovo, <i>Università di Trieste, Italy</i> |
| 9:20 | 8.5 | Beamforming with a Dual-Polarized Array for Reception of Satellite Signals C. B. Dietrich, K. Takamizawa, W. A. Davis, <i>Virginia Tech, USA</i> ; D. Colatosti, <i>Luna Innovations, USA</i> |
| 9:40 | 8.6 | Microstrip Implementation of Decoupling Networks for Multi-Port Arrays with Reduced Element Spacing P. T. Chua, J. C. Coetze, <i>National University of Singapore, Singapore</i> ; H. J. Chaloupka, <i>University of Wuppertal, Germany</i> |

Session 9. Dual Band & Wide Band Microstrip Antennas

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| Monday, June 21 7:55-12:00 | AP | DeAnza III |
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Co-Chairs: Custodio J. O. Peixeiro, *Instituto Superior Tecnico at Technical University of Lisbon, Portugal*
Nathan Champagne, *Louisiana Technical University, USA*

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| 7:55 | Opening Remarks |
| 8:00 | 9.1 Small Dual-Band Microstrip Patch Antenna Array for MIMO System Applications N. V. F. F. Crispim, R. M. C. A. Peneda, <u>C. J. O. Peixeiro</u> , <i>Instituto Superior Técnico, Portugal</i> |
| 8:20 | 9.2 A Base Station Antenna for Broadband and Dual-Frequency Operation <u>P. Li</u> , K. L. Lau, K. M. Luk, <i>City University of Hong Kong, China</i> |
| 8:40 | 9.3 Synthesis of Dualband Broadside Radiated Microstrip Patch Antenna Operating with TM10 and TM21 Modes <u>M. Polivka</u> , M. Drahovzal, M. Mazanek, <i>Czech Technical University in Prague, Czech Republic</i> |
| 9:00 | 9.4 A Wideband and Dual-Frequency Shorted-Patch Antenna with Compact Size K. L. Lau, <u>P. Li</u> , K. M. Luk, <i>City University of Hong Kong, China</i> |
| 9:20 | 9.5 Theoretical and Experimental Analysis of Dual-Band Circularly Polarized Microstrip Patch Antenna <u>H. Memarzadeh</u> , M. N. Azarmanesh, <i>Urmia University, Iran</i> |
| 9:40 | 9.6 Slot Loaded Micristrip Antennas for Tunable Dual Band Operation A. E. Daniel, <u>R. K. Shevgoankar</u> , <i>IIT Bombay, India</i> |
| 10:00 | 9.7 A Novel Printed Monopole Antenna with a Square Conductor-Backed Parasitic Plane for Dual-Band WLAN Applications <u>C. Y. Pan</u> , C. H. Huang, T. S. Horng, <i>National Sun Yat-Sen University, Taiwan</i> |
| 10:20 | 9.8 Swithchable Triangular Microstrip Patch Antenna for Dual-Frequency Operation <u>Y. J. Sung</u> , B. Y. Kim, T. U. Jang, Y. Y. -S. Kim, <i>Korea University, Korea</i> |
| 10:40 | 9.9 A New Structure of Broadband Millimeter Wave Antenna <u>H.-X. Zheng</u> , <i>Tianjin University, China</i> ; S.-Q. Zhang, <i>Engineering College of Armed Police Force, China</i> |
| 11:00 | 9.10 Wide-Band and High-Gain Microstrip Antenna with Thick Parasitic Patch Substrate <u>E. Nishiyama</u> , M. Aikawa, <i>Saga University, Japan</i> |
| 11:20 | 9.11 Design of a Novel Dual-Frequency Microstrip Patch Antenna for WLAN Applications Q. Zhong, Y. Li, H. Jiang, <u>Y. Long</u> , <i>Sun Yat-Sen University, China</i> |
| 11:40 | 9.12 A Dual-Frequency Triangular Patch Antenna on Magnetic Substrate <u>S.-S. Zhong</u> , Y.-H. Jiang, J.-C. Chen, <i>Shanghai University, China</i> |

Session 10. EBG Surfaces I

Monday, June 21 7:55-12:00

AP/URSI B: Joint Special Session

DeAnza II

Organizers: Per-Simon Kildal, *Chalmers University of Technology, Sweden*
Nader Engheta, *University of Pennsylvania, USA*

Co-Chairs: Per-Simon Kildal, *Chalmers University of Technology, Sweden*
Nader Engheta, *University of Pennsylvania, USA*

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| 7:55 | Opening Remarks |
| 8:00 | 10.1 Understanding STOP and GO Characteristics of EBG Surfaces in Terms of Current Fences and Current Lanes <u>P.-S. Kildal</u> , <i>Chalmers University of Technology, Sweden</i> |
| 8:20 | 10.2 Hard and Soft Surfaces Realized by FSS Printed on a Grounded Dielectric Slab <u>S. Maci</u> , <i>University of Siena, Italy</i> ; P.-S. Kildal, <i>Chalmers University of Technology, Italy</i> |
| 8:40 | 10.3 Incident-Angle Dependence of Electromagnetic Crystal (EMXT) Surface Impedance (ZS) <u>H. Xin</u> , <i>Raytheon Company, USA</i> |
| 9:00 | 10.4 A Novel Design Approach for an Independently Tunable Dual-Band EBG AMC Surface <u>M. G. Bray</u> , D. H. Werner, <i>Pennsylvania State University, USA</i> |
| 9:20 | 10.5 Miniaturised and Multiband Artificial Magnetic Conductors and Electromagnetic Bandgap Surfaces G. Goussetis, Y. Guo, A. P. Feresidis, <u>J. C. Vardaxoglou</u> , <i>Loughborough University, UK</i> |
| 9:40 | 10.6 New Compact and Wide-Band High-Impedance Surface <u>C. Simovski</u> ^{1,2} , A. Sochava ³ , S. Tretyakov ² |

¹*St. Petersburg Institute of Fine Mechanics and Optics, Russia;* ²*Helsinki University of Technology, Finland;* ³*St. Petersburg Polytechnical University, Russia*

- 10:00 10.7 **Embedded-Circuit and RIS Meta-Substrates for Novel Antenna Designs**
H. Mosallaei, K. Sarabandi, *The University of Michigan, USA*
- 10:20 10.8 **Full Wave Analysis of Mutual Coupling Between Dipoles over Different EBG Surfaces: AMC, Soft and Hard Surfaces**
Z. Sipus, *University of Zagreb, Croatia*; P.-S. Kildal, *Chalmers University of Technology, Sweden*
- 10:40 10.9 **Small Dipole Antenna near Peano High-Impedance Surfaces**
J. A. McVay, A. Hoorfar, *Villanova University, USA*; N. Engheta, *University of Pennsylvania, USA*
- 11:00 10.10 **Wire Antennas on Artificial Complex Ground Planes: A New Generation of Low Gain Antennas**
F. Yang, Y. Rahmat-Samii, *UCLA, USA*
- 11:20 10.11 **Bandwidth Determination for Soft and Hard Ground Planes: a Unified Approach in Visible and Surface Wave Regions**
A. Aminian, Y. Rahmat-Samii, *University of California, Los Angeles, USA*
- 11:40 10.12 **Radiation-Pattern Improvement of Patch Antennas Using a Compact Soft/Hard Surface (SHS) Structure on LTCC Multilayer Technology**
G. DeJean, R. Li, M. Tentzeris, J. Papapolymerou, J. Laskar, *Georgia Institute of Technology, USA*

Session 11. Smart Electromagnetic Materials, Devices and Applications

Monday, June 21 7:55-12:00

AP/URSI B: Joint Special Session

DeAnza I

Organizers: Thomas X. Wu, *University of Central Florida, USA*
Vasundara Varadan, *Pennsylvania State University, USA*

Co-Chairs: Thomas X. Wu, *University of Central Florida, USA*
Vasundara Varadan, *Pennsylvania State University, USA*

- 7:55 Opening Remarks
- 8:00 11.1 **The Use of Machine Learning in Smart Antennas**
C. G. Christodoulou¹, J. A. Rohwer², C. T. Abdallah¹
¹*University of New Mexico, USA*; ²*Sandia National Laboratories, USA*
- 8:20 11.2 **Laser-Metallized Silicon Carbide Antenna Coupled Diodes for Millimeter Wave Detection and Frequency Mixing**
A. Kar, *University of Central Florida, USA*; N. R. Quick, *AppliCote Associates, LLC, USA*
- 8:40 11.3 **Layer-by-Layer Stereolithography (SL) of Complex Medium**
X. Gong, *University of Michigan, USA*; B. Liu, L. P. B. Katehi, W. J. Chappell, *Purdue University, USA*
- 9:00 11.4 **Experimental Studies of Negative Refractive Index in Ordered and Random Chiral Composites**
V. V. Varadan, *The Pennsylvania State University, USA*; A. Tellakula, *HVS Technologies, Inc., USA*
- 9:20 11.5 **FDTD Analysis of the Performance of Patch Antennas with Metamaterial Substrates**
A. Semichaevsky, A. Akyurtlu, *University of Massachusetts Lowell, USA*
- 9:40 11.6 **Photoinduced Anisotropy in Smart Biomolecule Bacteriorhodopsin and for Photonic Applications**
Y. Huang, S.-T. Wu, *University of Central Florida, USA*
- 10:00 11.7 **Smart Soft Electromagnetic Materials and Applications**
T. X. Wu, S.-T. Wu, J. Fang, *University of Central Florida, USA*; V. Varadan, *National Science Foundation, USA*
- 10:20 11.8 **Dielectric Properties of Polymer Materials at a High Microwave Frequency**
L. Zong, L. C. Kempel, M. C. Hawley, *Michigan State University, USA*
- 10:40 11.9 **Asymptotic Conditions on Transmission Line Models for Parameter Adjustable Waveguiding Structures on a Semiconductor Substrate**
M. El-Dessouki, T. T. Y. Wong, *Illinois Institute of Technology, USA*
- 11:00 11.10 **FDTD Simulation of Tunneling and “Growing Exponential” in a Pair of α -negative and i -negatives Slabs**
A. Alù, *University of Roma Tre, Italy*; N. Engheta, *University of Pennsylvania, USA*; R. W. Ziolkowski, *University of Arizona, USA*

- 11:20 11.11 **Experimental Studies on the Bulk Electromagnetic Properties of Frequency dependent Metamaterials**
V. V. Varadan, *The Pennsylvania State University, USA*; A. Tellakula, *HVS Technologies, Inc., USA*
- 11:40 11.12 **Smart Liquid Crystal Microstrip Phase Shifter**
L. Zheng¹, T. X. Wu¹, H. Wang¹, W. Brokaw^{1,2}, S.-T. Wu¹
¹*University of Central Florida, USA*; ²*Harris Corporation, USA*

Session 12. Inroads of Multigrid and Domain Decomposition Methods

Monday, June 21 7:55-12:00

AP/URSI B: Joint Special Session

Bonsai I

Organizers: Romanus Dyczij-Edlinger, *Universitat des Saarlandes, Germany*
Jin-Fa Lee, *The Ohio State University, USA*

Co-Chairs: Romanus Dyczij-Edlinger, *Universitat des Saarlandes, Germany*
Jin-Fa Lee, *The Ohio State University, USA*

- 7:55 Opening Remarks
- 8:00 12.1 **A Domain Decomposition Method for the Solution of Large Electromagnetic Problems Using a Massively Parallel Hybrid Finite Element - Integral Equation MLFMA**
D. Goudin, M. Mandallena, K. Mer-Nkonga, B. Stupfel, *CEA/CESTA, France*
- 8:20 12.2 **Field Iterative Method for PEC Cavity Modeling**
C. F. Wang, Y. B. Gan, Y. Xu, *Temasek Lab., Singapore*; G. A. Thiele, *University of Dayton, USA*
- 8:40 12.3 **Modeling Large Almost Periodic Structures Using a Non-Overlapping Domain Decomposition Method**
M. Vouvakis, K. Zhao, J.-F. Lee, *OSU, USA*
- 9:00 12.4 **Domain Decomposition via the Transfinite Element Method**
Z. Cendes, D. Crawford, *Ansoft Corporation, USA*
- 9:20 12.5 **Multi-Level Decomposition Approach to Translational Symmetry Problems of Several Dimensions**
R. W. Kindt, J. Volakis, *OSU, USA*
- 9:40 12.6 **Domain Decomposition Methods on Non-Matching Grids in Electromagnetic Field Computation**
R. Hoppe, *University of Houston, USA*
- 10:00 12.7 **Robust Finite Element Modeling of Electromagnetic Interactions in Complex Structures via Multigrid and Multilevel Preconditioning**
A. Cangellaris, *University of Illinois, USA*; Y. Zhu, *Cadence Design Systems, USA*
- 10:20 12.8 **An a Posteriori Error Estimator for the Multi-Level FE Solution of Time-Harmonic Fields**
V. Hill, O. Farle, R. Dyczij-Edlinger, *Saarland University, Germany*
- 10:40 12.9 **Multiresolution MoM: a Multi-Grid Approach**
P. Pirinoli, F. Vipiana, G. Vecchi, *CERCOM, LACE, Italy*
- 11:00 12.10 **FEM/PO-PTD for Evaluation of Scattering by Complex Objects**
W.-P. Ding, *Institute of Communications Engineering, China*
- 11:20 12.11 **Subdomain Multilevel Approach with Fast MBF Interactions**
I. Stevanovic, J. R. Mosig, *Swiss Federal Institute of Technology, Switzerland*
- 11:40 12.12 **Isoparametric Second Order Nédélec Tetrahedral Finite Element**
M. Casas, L. E. García-Castillo, *Universidad de Alcalá, Spain*

Session 13. EMI/EMC Modeling/Validation Part I

Monday, June 21 7:55-12:00

AP/URSI B&E: Joint Special Session

Bonsai II

Organizers: Danilo Erricolo, *University of Illinois at Chicago, USA*
Michael Lockard, *Clemson University, USA*

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| Co-Chairs: | Danilo Erricolo, <i>University of Illinois at Chicago, USA</i> Michael Lockard, <i>Clemson University, USA</i> |
| 7:55 | Opening Remarks |
| 8:00 13.1 | EMC Coupling to a Circuit Board from a Wire Penetrating a Cavity Aperture <u>C. Lertsirimit</u> , D. R. Jackson, D. R. Wilton, <i>University of Houston, USA</i> ; D. Erricolo, D. H. Y. Yang, <i>University of Illinois at Chicago, USA</i> |
| 8:20 13.2 | Coupling to Wires in Cavity Enclosure using Iterative Algorithm <u>T. Yang</u> , <i>University of Michigan, USA</i> ; J. L. Volakis, <i>Ohio State University, USA</i> |
| 8:40 13.3 | A Study of Wideband Signal Propagation thru Cascaded Rectangular Cavities: Efficient Modeling using Matrix Interpolation Techniques <u>V. Ramani, A. Q. Martin</u> , <i>Clemson University, USA</i> |
| 9:00 13.4 | On the Use of Extrapolation Methods to Assess the Effects of Propagation Path on Signals Penetrating Electronic Systems Due to HPM Sources <u>C. Sreerama, A. Q. Martin</u> , <i>Clemson University, USA</i> |
| 9:20 13.5 | Penetration into Nested Cavities Through Apertures <u>D. Negri</u> , D. Erricolo, P. L. E. Uslenghi, <i>University of Illinois at Chicago, USA</i> |
| 9:40 | Break |
| 10:00 13.6 | Time Domain Adaptive Integral Method for EMI/EMC Applications <u>A. E. Yilmaz</u> , A. C. Cangellaris, J.-M. Jin, E. Michielssen, <i>University of Illinois at Urbana Champaign, USA</i> |
| 10:20 13.7 | Penetration Through a Slot in a Conducting Plane Backed by a Channel, Part II: TM Excitation <u>M. D. Lockard</u> , C. M. Butler, <i>Clemson University, USA</i> |
| 10:40 13.8 | Radiation from an Antenna in a Partially Covered Cavity near a 2D or 3D Corner <u>D. Erricolo, P. L. E. Uslenghi</u> , <i>University of Illinois at Chicago, USA</i> |
| 11:00 13.9 | Incident Field Excitation of a Random Two-Wire Transmission Line <u>J. C. Pincenti</u> , P. L. E. Uslenghi, <i>University of Illinois at Chicago, USA</i> |
| 11:20 13.10 | Field Coupling Analysis of Multiconductor Transmission Lines in Presence of Complex Platforms via a Hybrid MOM-Spice Technique <u>Y. Bayram</u> , J. L. Volakis, <i>The Ohio State University, USA</i> |
| 11:40 13.11 | Shield Effectiveness of Metallic Box with Apertures: Electromagnetic Field Configuration <u>M. A. Mathias</u> , J. M. Janiszewski, <i>Maua Institute of Technology, Brazil</i> |

Session 14. Applications of Novel Analysis Methods

Monday, June 21 7:55-12:00

AP/URSI B

Bonsai III

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| Co-Chairs: | William Johnson, <i>Sandia National Laboratories, USA</i> John S. Asvestas, <i>NAVAIR, USA</i> |
| 7:55 | Opening Remarks |
| 8:00 14.1 | Scattering from Conducting/Dielectric Composite Objects Using Combined Field Integral Equation <u>B. Jung</u> , <i>Hoseo University, Korea</i> ; <u>T. K. Sarkar</u> , <i>Z. Ji</i> , <i>Syracuse University, USA</i> ; <u>M. Salazar-Palma</u> , <i>Politecnico University of Madrid, Spain</i> |
| 8:20 14.2 | Efficient Sensitivity Analysis Using Coupled Circuit-Electromagnetic Simulation <u>Y. Wang</u> , V. Jandhyala, C. J. R. Shi, <i>University of Washington, USA</i> |
| 8:40 14.3 | Concurrent Complementary Operators Method for the Absorption of Evanescent Waves in Frequency-Domain Finite Element Simulations <u>X. Wu</u> , O. M. Ramahi, <i>University of Maryland, USA</i> |
| 9:00 14.4 | On the Higher-Order MoM-PO Electromagnetic Modeling of Vehicles <u>B. M. Notaros</u> , M. Djordjevic, <i>University of Massachusetts Dartmouth, USA</i> |
| 9:20 14.5 | Solution of Large Radiation and Scattering Problems Without Iteration Using the Fast Matrix Solver (FMS) and the Characteristic Basis Function Method (CBFM) <u>R. Mittra</u> , T. Zhao, J. Yeo, S. Koksoy, <i>Pennsylvania State University, USA</i> |

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| 9:40 | 14.6 | Boundary Integral Equations for a Monopole Backed by a Ground Plane J. S. Asvestas, <i>NAVAIR, USA</i> |
| 10:00 | 14.7 | Coaxial Line Radiation into a Half-Space J. S. Asvestas, <i>NAVAIR, USA</i> |
| 10:20 | 14.8 | A New Technique Based on the Cell Method for Calculating the Propagation Constant of Inhomogeneous Filled Waveguides M. Marrone ¹ , P. Grassi ² , R. Mittra ¹ ¹ <i>Pennsylvania State University, USA</i> ; ² <i>University of Pisa, Italy</i> |
| 10:40 | 14.9 | Input Impedance Analysis of Spherical Conformal Antennas by Means of Conformal Transformation X. Xiaojing, Z. Qi, L. Yan, <i>University of Science & Technology of China, China</i> |
| 11:00 | 14.10 | Dielectric Loaded Slot in a Parallel-Plate Waveguide Coupled to a Conducting Cylinder C. Ozzaim, <i>Dumlupinar University, Turkiye</i> |
| 11:20 | 14.11 | Flanged Parallel-Plate Waveguide Loaded by Conducting and Dielectric Cylinder C. Ozzaim, <i>Dumlupinar University, Turkiye</i> |
| 11:40 | 14.12 | An Efficient Approach for the Evaluation of MoM Matrix Entries for Vertical Antennas in Planar Stratified Media R. M. Shubair, <i>Etisalat College of Engineering, UAE</i> |

Session 15. Analysis and Diagnosis of Propagation and Coupling

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| Monday, June 21 7:55-10:00 | URSI B | Redwood |
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Co-Chairs: Gianluca Lazzi, *North Carolina State University, USA*
Robert Paknys, *Concordia University, Canada*

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| 7:55 | Opening Remarks | |
| 8:00 | 15.1 | Indoor Transmitter Localization via DF/AOA Technique N. Yildirim Güler, I. Tekin, <i>Sabanci University, Turkey</i> |
| 8:20 | 15.2 | Enhancing MIMO Channel Capacity Through Co-Located Loops and Dipoles A. Konanur, K. Gosalia, S. Krishnamurthy, B. Hughes, G. Lazzi, <i>North Carolina State University, USA</i> |
| 8:40 | 15.3 | Propagation Modelling of Composite Inhomogeneous Materials for In-Building Wireless Systems M. J. Neve, A. G. Williamson, <i>The University of Auckland, New Zealand</i> ; R. Paknys, <i>Concordia University, Canada</i> |
| 9:00 | 15.4 | Multi-Cavity PCB Mounted Enclosure Shielding Effectiveness Measurement and FEM/BE Analysis B. A. Lail, <i>University of Central Florida, USA</i> ; L. S. Freeman, <i>Harris Corporation, USA</i> |
| 9:20 | 15.5 | Applications of Shielding Techniques to Enhance the Antenna Performance and SAR Reduction in Mobile Communications S.-C. Tuan, H.-T. Chou, J.-S. Wang, <i>Yuan Ze University, Taiwan</i> |
| 9:40 | 15.6 | Eigenvalues of Sheath Waves in Uniaxially Anisotropic Plasma T. Hashimoto, <i>Yatsushiro National College of Technology, Japan</i> |

Session 16. Direction of Arrival Estimation

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| Monday, June 21 7:55-12:00 | AP | Ironwood |
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Co-Chairs: Tapan Sarkar, *Syracuse University, USA*
Michael Chryssomallis, *University of New Mexico, USA*

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| 7:55 | Opening Remarks | |
| 8:00 | 16.1 | Azimuth and Elevation Direction Finding with Planar Arrays Using Thompson's Adaptive Method R. L. Haupt, S. Biyani, T. Bose, <i>Utah State University, USA</i> |

- 8:20 16.2 **Mutual Coupling in Adaptive Circular Arrays**
P. Ioannides, C. A. Balanis, *Arizona State University, USA*
- 8:40 16.3 **On Decorrelation Performance of Weighted Spatial Smoothing**
B. Wang, *Nanjing Research Institute of Electronics Technology, China*
- 9:00 16.4 **Determination of the Direction of Arrival (DOA) and of the User Through a Single Algorithm EM in CDMA Systems**
R. Zelenovsky, A. G. M. Lima, L. R. A. X. Menezes, *University of Brasília, Brazil*; M. A. Grivet, *Catholic University, Brazil*
- 9:20 16.5 **Semi-Circular Array Antennas for DOA-Estimation and Beamforming**
J. Freese, C. Müller, M. Schüßler, R. Jakoby, *Technische Universität Darmstadt, Germany*
- 9:40 16.6 **Estimation of Direction of Arrival for Coherent Signals in Wireless Communication Systems**
K. V. Nikolakopoulos¹, D. E. Anagnostou², C. G. Christodoulou², M. T. Chryssomallis¹
¹*Democritus University of Thrace, Greece*; ²*The University of New Mexico, USA*
- 10:00 16.7 **High Resolution DOA Estimation Using Matrix Pencil**
J. Koh, *GyungSang National University, Korea*; T. K. Sarkar, *Syracuse University, USA*
- 10:20 16.8 **A Multitarget Adaptive Array Algorithms for Wireless CDMA Systems**
M. A. E. M. Adam, H. M. Elkamchouchi, *Alexandria University, Egypt*
- 10:40 16.9 **Planar Array for Accelerated Sources Tracking Using Local Polynomial Approximation Beamformer**
A. S. Ashour, *Assistant lecturer, Egypt*; H. M. Elkamchouchi, *Alexandria University, Egypt*; M. E. Nasr, *Tanta University, Egypt*
- 11:00 16.10 **A Broadband Solution to Estimate DOA Using an Interpolation Technique**
R. Fernandez-Recio, L. E. Garcia-Castillo, *Universiy of Alcala, Spain*; T. K. Sarkar, *Syracuse University, USA*; M. Salazar-Palma, *Universidad Politecnica de Madrid, Spain*
- 11:20 16.11 **Array Calibration in the Presence of Multipath Based on CODE Criterion**
B. Wang, *Nanjing Research Institute of Electronics Technology, China*
- 11:40 16.12 **Comments on "Multiresolution-Signal Direction-of-Arrival Estimation Based on Wavelet Decomposition"**
R. Li, *Wuhan Radar Academy, China*

Session 17. Wave Guiding Structures

Monday, June 21 7:55-12:00

URSI B

Cottonwood

Co-Chairs: Yehuda Leviatan, *Technion, Israel*
Jiming Song, *Iowa State University, USA*

- 7:55 Opening Remarks
- 8:00 17.1 **Interpretation of Resonance at Inclined Multi-Aperture Rectangular Iris with Arbitrary Locations in Rectangular Waveguide**
J. M. Rebollar, J. A. Ruiz-Cruz, *Universidad Politecnica de Madrid, Spain*
- 8:20 17.2 **Application of the 2.5-D Pseudospectral Time-Domain (PSTD) Algorithm to Eccentric Waveguide Analysis**
G. Zhao¹, S. A. Wartenberg², Q. H. Liu¹
¹*Duke University, USA*; ²*RD Micro Devices, USA*
- 8:40 17.3 **Extension of Phase Shift by Installing Grooves or Steps in Slit Coupling on the Common Broad Wall between Two Shorted Rectangular Waveguides**
J. Hirokawa, *Tokyo Institute of Technology, Japan*; M. Furukawa, *Nihon Dengyo Kosaku, Japan*; K. Cho, *NTT DoCoMo, Japan*; N. Goto, *Takushoku University, Japan*
- 9:00 17.4 **Micromachining of High Frequency Integrated Waveguide Structures and Circuits**
W. H. Chow, A. Champion, D. P. Steenson, *Institute of Microwaves and Photonics, UK*
- 9:20 17.5 **Dispersion Characteristics of Multilayer Open Microstrip Lines over Thin Metal Ground**
L. Zhang, J. Song, *Iowa State University, USA*
- 9:40 17.6 **Analysis of Photonic-Crystal Fibers Using a Source-Model Technique**
A. Hochman, Y. Leviatan, *Technion, Israel*
- 10:00 17.7 **LiquidCrystal All Optical Waveguide Switch**
M. K. Khan, T. X. Wu, Y. Lu, S.-T. Wu, *University of Central Florida, USA*

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- 10:20 17.8 **Non-Uniform Guided Waveguide Modeling of Printed Circuit Board Via Structures**
F. Gisin, Sanmina-SCI, USA; Z. Pantic-Tanner, University of Texas at San Antonio, USA
- 10:40 17.9 **Properties of Guided Waves in Arrays of Periodically Arranged Dipoles**
A. J. Viitanen, Helsinki University of Technology, Finland
- 11:00 17.10 **An Efficient Perturbation Analysis of Dielectric Periodic Structure**
X. Yang, T. X. Wu, University of Central Florida, USA
- 11:20 17.11 **An Application of the T Chart for Nonreciprocal Stub Tuners**
D. Torrungrueng, C. Thimaporn, T. Mekathikom, A. Darawankul, Asian University of Science and Technology, Thailand
- 11:40 17.12 **An Application of the T Chart for Solving Exponentially Tapered Lossless Nonuniform Transmission Line Problems**
D. Torrungrueng, C. Thimaporn, T. Mekathikom, Asian University of Science and Technology, Thailand
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Session 18. Wearable Antennas

Monday, June 21 10:00-12:00

AP

San Carlos III

Co-Chairs: Pekka Salonen, *University of California Los Angeles, USA*
Yahya Rahmat-Samii, *University of California Los Angeles, USA*

- 10:00 18.1 **A Multi-Band Body-Worn Antenna Vest**
E. C. Kohls, A. Abler, Windermere IT Systems, USA; P. Siemsen, J. Hughes, R. Perez, Southwest Research Institute, USA; D. Widdoes, NSA National Technical Integration Office, USA
- 10:20 18.2 **WEBGA – Wearable Electromagnetic Band-Gap Antenna**
P. O. Salonen, F. Yang, Y. Rahmat-Samii, UCLA, USA; M. Kivikoski, Tampere University of Technology, Finland
- 10:40 18.3 **Effect of Conductive Material on Wearable Antenna Performance: A Case Study of WLAN Antennas**
P. O. Salonen, Y. Rahmat-Samii, UCLA, USA; H. Hurme, M. Kivikoski, Tampere University of Technology, Finland
- 11:00 18.4 **Effect of Textile Materials on Wearable Antenna Performance: A Case Study of GPS Antennas**
P. O. Salonen, Y. Rahmat-Samii, UCLA, USA; M. Schaffrath, M. Kivikoski, Tampere University of Technology, Finland
- 11:20 18.5 **Dual-Band Wearable Textile Antenna**
P. O. Salonen, Y. Rahmat-Samii, UCLA, USA; H. Hurme, M. Kivikoski, Tampere University of Technology, Finland
- 11:40 18.6 **Wearable Antennas in the Vicinity of Human Body**
P. O. Salonen, Y. Rahmat-Samii, UCLA, USA; M. Kivikoski, Tampere University of Technology, Finland
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Session 19. Circular and Dual Polarized Microstrip & PatchAntennas

Monday, June 21 10:00-12:00

AP

Ferrante III

Co-Chairs: Elena Semouchkina, *Pennsylvania State University, USA*
George Semouchkin, *Pennsylvania State University, USA*

- 10:00 19.1 **Design of an Annular-Ring Microstrip Antenna for Circular Polarization**
C. Y. D. Sim, K.-W. Lin, J.-S. Row, Chien Kuo Institute of Technology, Taiwan
- 10:20 19.2 **Casing Effects on the Radiation Performance of a Circularly Polarized Patch Antenna**
K. Rambabu, H. A. Thiart, J. Bornemann, University of Victoria, Canada
- 10:40 19.3 **Effect of Dielectric Material Tolerances on the Performance of Singly-Fed Circularly Polarised Stacked Patch Antennas**
K. L. Chung, A. S. Mohan, University of Technology Sydney, Australia

- 11:00 19.4 **Radiation Pattern of Helical Microstrip Antenna Mounted on a Dielectric Coated Circular Cylinder**
J. Sun, C.-F. Wang, L.-W. Li, M.-S. Leong, *National University of Singapore, Singapore*
- 11:20 19.5 **On the Synthesis of Uniformly Spaced Dual Polarized Linear Series-Fed Microstrip Arrays: A Partly Empirical Approach**
A. Vallecchi, G. Biffi Gentili, *University of Florence, Italy*
- 11:40 19.6 **A New Approach for Enhancement Circular Polarization Output in Square Shaped Microstrip Patch Antennas**
E. Semouchkina¹, G. Semouchkin¹, M. Lanagan¹, I. Ivanchenko², S. Koroljev³, N. Popenko²
¹*Pennsylvania State University, USA*; ²*Institute for Radiophysics and Electronics, Ukraine*; ³*Institute of Radioastronomy, Ukraine*

Session 20. EM Measurements

Monday, June 21 10:00-12:00

AP

Ferrante I

- Co-Chairs: Ross Speciale, *Research and Development, Inc., USA*
Anthony Jennetti, *Northrup Grumman Mission Systems, USA*
- 10:00 20.1 **Noise Diagnosis Techniques in Conducted Electromagnetic Interference (EMI) Measurement: Methods Analysis and Design**
Y. Zhao¹, K. Y. See², S.-J. Li¹
¹*Nanjing Normal University, China*; ²*Nanyang Technological University, Singapore*
- 10:20 20.2 **Resonance Suppressed Magnetic Probe for Measuring Electromagnetic Field Intensity**
J.-M. Kim¹, W.-Y. Song², J.-G. Yook¹
¹*Yonsei University, Korea*; ²*Chongju University, Korea*
- 10:40 20.3 **Influence of the Ground Plane Geometry on the Normalized Site Attenuation of an OATS**
S. Battermann, H. Garbe, *Institute of the Basics of Electrical Engineering and Measurement Science, Germany*
- 11:00 20.4 **An RCS Measurement Technique to Extract the Impedance of High-Impedance Aperture and Slot Antennas**
R. Azadegan, K. Sarabandi, *The University of Michigan, USA*
- 11:20 20.5 **Accurate Permittivity Measurement by Means of Inverse Calculation Based on Genetic Algorithms**
M. E. Requena-Perez, A. Diaz-Morcillo, J. Monzo-Cabrera, *Universidad Politecnica de Cartagena, Spain*
- 11:40 20.6 **Computing the Scattering Matrix of Multiport Systems**
R. A. Speciale, *Research & Development Inc., USA*

Session 21. Antenna Array Optimization

Monday, June 21 10:00-12:00

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- Co-Chairs: William Davis, *Virginia Polytechnic Institute and State University, USA*
Vakur Erturk, *Bilkent University, Turkey*
- 10:00 21.1 **Neural Network-based Pattern Synthesis of Array Antennas with Element Specification**
R. G. Ayestaran, F. Las-Heras, L. F. Herran, *Universidad de Oviedo, Spain*
- 10:20 21.2 **Inter-Element Coupling in Large Arrays by an ANN Approach**
G. Pelosi, A. Pinto, C. Riminesi, S. Selleri, M. Tatini, *University of Florence, Italy*
- 10:40 21.3 **Novel Chromosome Generation Method for Genetic Algorithm Applied to Planar and Meander-line Antenna Design**
T. Maruyama, F. Kira, K. Cho, *NTTDocomo, Japan*
- 11:00 21.4 **Sidelobe Minimization in Interrupted Phased Arrays by Means of a Genetic Algorithm**
D. A. Tonn, *Naval Undersea Warfare Center, USA*; R. Bansal, *University of Connecticut, USA*

- 11:20 21.5 **Radial-Line Slot-Array Antenna Equivalent Network Model for Fast Design and Optimization**
A. valero-Nogueira, J. Herranz-Herruzo, M. Ferrando-Bataller, E. Antonino-Daviu, Universidad Politecnica de Valencia, Spain
- 11:40 21.6 **Interference Cancellation Using an Array Feed Design for Radio Telescopes**
C. K. Hansen, K. F. Warnick, B. D. Jeffs, Brigham Young University, USA

Session 22. Planar & Linear Arrays

Monday, June 21 13:25-16:50

AP

San Carlos I

Co-Chairs: Amir Zaghloul, *Virginia Polytechnic Institute and State University, USA*
Robert J. Mailloux, *Air Force Research Laboratory Hanscom AFB, USA*

- 13:25 Opening Remarks
- 13:30 22.1 **Preconditioned MoM Solutions for Complex Planar Arrays**
B. J. Fasenfest, D. R. Wilton, University of Houston, USA
- 13:50 22.2 **Analytical and Optimization Methods for Linear Arrays with High Efficiency and Low Sidelobes**
*S. K. Smith¹, J. C. Bregains², K. L. Melde¹, F. J. Ares²
¹University of Arizona, USA; ²University of Santiago de Compostela, Spain*
- 14:10 22.3 **Performance of a Wideband (3-14 GHz) Dual-Pol Array**
J. J. Lee, S. Livingston, R. Koenig, Raytheon Systems Co., USA
- 14:30 22.4 **Wideband Periodic Array of Random Subarrays**
K. C. Kerby, J. T. Bernhard, University of Illinois at Urbana-Champaign, USA
- 14:50 22.5 **Antenna Array Submodule Synthesization and Optimization Techniques**
D. Busuioc, M. Shahabadi, S. Safavi-Naeini, University of Waterloo, Canada; S. Suleiman, Winegard Company, USA
- 15:10 22.6 **Fractile Arrays: A New Class of Broadband Tiled Arrays with Fractal Boundaries**
D. H. Werner, W. Kuhirun, P. L. Werner, Penn State University, USA
- 15:30 22.7 **A Monolithic Active Conical Horn Antenna Arrays for Millimeter and Sub-Millimeter Wave Applications**
V. Douvalis, Y. Hao, Queen Mary University of London, UK
- 15:50 22.8 **Comparison of Measured and Modeled Performance of a Tensioned Membrane Waveguide Array Antenna**
*G. D. Hopkins, Georgia Tech Research Institute, USA; R. L. Cravey, D. T. Fralick, NASA, USA;
D. Lichodziejewski, F. Redell, L'Garde, Inc., USA; M. C. Bailey, Research Triangle Institute, USA*
- 16:10 22.9 **A Wavelet Representation of the Far Field of Hexagonal Lattice Arrays**
*F. Vipiana¹, M. Sabbadini², G. Vecchi¹
¹Politecnico di Torino, C.so Duca degli Abruzzi 24, Italy; ²European Space Agency, The Netherlands*
- 16:30 22.10 **Effects of Array Guided Surface Waves on Radiation Characteristics of a Finite Planar Printed Dipole Array**
O. Aydin Civi, Middle East Technical University, Turkey; P. Janpugdee, P. H. Pathak, The Ohio State University, USA

Session 23. Algorithmic Advances for FDTD Simulation

Monday, June 21 13:25-15:30

AP

San Carlos II

Co-Chairs: Jeffrey Young, *University of Idaho, USA*
Omar Ramahi, *University of Maryland, USA*

- 13:25 Opening Remarks
- 13:30 23.1 **Perfectly Matched Layer for Crank-Nicolson (CN) FDTD Method**
D. D. Wu, J. Chen, University of Houston, USA

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| 13:50 | 23.2 | Complementary Operators Method for ADI-FDTD Open-Region Simulations <u>M. H. Kermani</u> , O. M. Ramahi, <i>University of Maryland, USA</i> |
| 14:10 | 23.3 | Some Considerations on Using Implicit FDTD Method <u>R. Qiang</u> , D. D. Wu, J. Chen, <i>University of Houston, USA</i> |
| 14:30 | 23.4 | Instable ADI-FDTD Open-Region Simulation <u>M. H. Kermani</u> , X. Wu, O. M. Ramahi, <i>University of Maryland, USA</i> |
| 14:50 | 23.5 | Coupled Stability Analysis for the Open-Region Finite-Difference Time-Domain Simulations <u>X. Wu</u> , O. M. Ramahi, <i>University of Maryland, USA</i> |
| 15:10 | 23.6 | TEM Mode Excitation and Detection in FDTD Analysis <u>J. L. Young</u> , <u>R. S. Adams</u> , <i>University of Idaho, USA</i> |

Session 24. Antennas for Wireless Communications

Monday, June 21 13:25-15:30

URSI B

San Carlos III

Co-Chairs: Zhijun Zhang, *Amphenol T&M Antennas, USA*
Cornelius F. Du Toit, *Paratek Microwave, Inc., USA*

| | |
|-------|---|
| 13:25 | Opening Remarks |
| 13:30 | 24.1 A Diversity Antenna for 3G Wireless Communications <u>A. Khaleghi</u> , A. Azoulay, J. C. Bolomey, <i>SUPELEC, France</i> |
| 13:50 | 24.2 Isolated Magnetic Dipole Antenna for Cell Phone GPS and ISM Applications <u>S. Rowson</u> , G. Poilasne, L. Desclos, <i>Ethertronics, USA</i> |
| 14:10 | 24.3 Internal Antenna Placement on Folding-Type Phones <u>C. R. Rowell</u> , <i>Molex Inc., China</i> ; S. Zeilinger, <i>Molex Inc., USA</i> |
| 14:30 | 24.4 Design of a 26Ghz Uniplanar Marconi-Franklin Type Printed Antenna on a High Permittivity Substrate G. Mitropoulos ¹ , M. Gargalakos ² , R. Makri ² , <u>N. K. Uzunoglu</u> ¹ ¹ <i>National Technical University of Athens, Greece</i> ; ² <i>Institute of Communications and Computer Systems, Greece</i> |
| 14:50 | 24.5 Circular Scanning Array Antenna for Wireless Applications <u>C. F. Du Toit</u> , J. E. Kvarnstrand, J. Patel, P. F. Acsadi, C. Sui, J. Norfolk, <i>Paratek Microwave, Inc., USA</i> |
| 15:10 | 24.6 A 5-GHz Horizontally Polarized Printed Omnidirectional Antenna for 802.11a WLAN Applications H.-R. Chunag, <u>C.-C. Lin</u> , S.-W. Kuo, <i>University Road, Taiwan</i> |

Session 25. Efficient Numerical Methods

Monday, June 21 13:25-17:30

AP

San Carlos IV

Co-Chairs: Chalmers Butler, *Clemson University, USA*
Amir Boag, *Tel Aviv University, Israel*

| | |
|-------|--|
| 13:25 | Opening Remarks |
| 13:30 | 25.1 Element Free Galerkin Method for Rectangular Waveguide Eigenvalues Calculation <u>O. B. Leong</u> , <i>National University of Singapore, Singapore</i> |
| 13:50 | 25.2 A High Frequency Integral Equation (HFIE) Method for the Scattering from Finite Gently Undulating Random Surfaces <u>A. Monorchio</u> , G. Tiberi, M. De Giorgi, G. Manara, <i>University of Pisa, Italy</i> |
| 14:10 | 25.3 Numerical Simulations of Rough Surface Scattering with UV Multi-level Partitioning Method L. Tsang ^{1,2} , P. Xu ¹ , Q. Li ² , D. Chen ¹ ¹ <i>City University of Hong Kong, China</i> ; ² <i>University of Washington, USA</i> |
| 14:30 | 25.4 A High-Frequency Approximation for Random Rough Surface Problems <u>S. Ohnuki</u> , <i>Nihon University, Japan</i> ; W. C. Chew, <i>University of Illinois at Urbana-Champaign, USA</i> |

- 14:50 25.5 **A Fast Non-Conforming DP-FETI Domain Decomposition Method for the Solution of Large EM Problems**
M. N. Vouvakis, J.-F. Lee, *ElectroScience Lab. at The Ohio State University, USA*
- 15:10 25.6 **Hybrid Non-uniform Grid Based Fast Global Boundary Conditions for Concave Scatterers**
A. Boag, U. Shemer, R. Kastner, *Tel Aviv University, Israel*
- 15:30 25.7 **A Multipole Expansions Method for Acoustic Wave Propagation in Vocal Tract**
F. Seydou, T. Seppanen, O. M. Ramahi, *University of Oulu, Finland*
- 15:50 25.8 **An Efficient Plane Wave Expansion Algorithm for Analyzing Low Frequency Scattering Problems**
M. Ayatollahi, S. Safavi-Naeini, *University of Waterloo, Canada*
- 16:10 25.9 **Efficient Analysis of Large Dense Method of Moments Matrices**
M. R. Zunoubi, *State University of New York - New Paltz, USA*; A. A. Kishk, *The University of Mississippi, USA*
- 16:30 25.10 **A Memory-Reduction Scheme for the FFT T-Matrix Method**
K. T. Kim, *Air Force Research Laboratory, USA*
- 16:50 25.11 **Application of the Adaptive Basis Functions/Diagonal Moment Matrix Technique to Arrays of Dielectric Scatterers**
I. A. Eshrah, A. A. Kishk, *University of Mississippi, USA*
- 17:10 25.12 **Transparent Grid Termination (TGT): Theoretical and Computational Enhancements**
G. Mason, D. R. Voltmer, *Rose-Hulman Institute of Technology, USA*; J. Lebaric, *Naval Postgraduate School, USA*

Session 26. Lens Antennas

Monday, June 21 13:25-15:30

AP

Ferrante III

Chair: Ozlem Kilic, *U.S. Army Research Laboratory, Adelphi, USA*

- 13:25 Opening Remarks
- 13:30 26.1 **A Rotman Lens Fed Ridge-Element Multibeam Array Demonstrator**
T.-H. Chio, *DSO National Laboratories, Singapore*; K.-K. Chan, *Chan Technologies Inc, Canada*
- 13:50 26.2 **Dielectric Rotman Lens Design for Multi-Function RF Antenna Applications**
O. Kilic, S. Weiss, *U.S. Army Research Laboratory, USA*
- 14:10 26.3 **Broadband Lens Antenna for Wireless Communications**
R. Alkhatib, M. Drissi, *IETR, CNRS UMR 6164, INSA Rennes, France*
- 14:30 26.4 **FDTD Analysis of Reduced Size Substrate Lens Antennas**
G. Godi, R. Sauleau, *IETR - Institut d'Electronique et de Télécommunications de Rennes, France*
- 14:50 26.5 **Cost Effective Antenna for LEO Satellites Communication System Using a Homogeneous Lens**
F. Averty¹, A. Louzir², J.-F. Pintos², P. Chambelin¹, C. Person¹, G. Landrac¹, J.-P. Coupez¹
¹*ENST de Bretagne, France*; ²*Thomson, France*
- 15:10 26.6 **A Planar Filter-Lens Array for Millimeter-Wave Applications**
A. Abbaspour-Tamijani, K. Sarabandi, G. M. Rebeiz, *University of Michigan, USA*

Session 27. Numerical Analysis of Antennas

Monday, June 21 13:25-15:30

AP

Ferrante II

Co-Chairs: Jeffrey Williams, *University of Houston, USA*
Guiseppe Vecchi, *Politecnico di Torino, Italy*

- 13:25 Opening Remarks
- 13:30 27.1 **Analysis of the Time-Reversal Operator for Planar Dipole Arrays**
D. H. Chambers, J. G. Berryman, *Lawrence Livermore National Laboratory, USA*

- 13:50 27.2 **Synthetic-Functions Analysis of Antennas and Inter-Antenna Coupling in Complex Environments**
L. Matekovits, V. A. Laza, G. Vecchi, *Politecnico di Torino, Italy*
- 14:10 27.3 **Effect of Superstrate Thickness on the Performance of Broadband Circularly Polarised Stacked Patch Antenna**
K. L. Chung, A. S. Mohan, *Microwave and Wireless Technology Research Lab, Australia*
- 14:30 27.4 **Practical Revision of Near-Field to Far-Field Zone Transition of Real Antennas**
F. Las-Heras, M. Rodriguez-Pino, S. Loredo, *University of Oviedo, Spain*
- 14:50 27.5 **Coupled IE-PO Method for Analysis of Antenna Radiation Patterns in the Presence of a Large 3D Radome**
W. J. Zhao, Y. B. Gan, C. F. Wang, L. W. Li, *National University of Singapore, Singapore*
- 15:10 27.6 **Double-Sided Isosceles Triangular and Figure-Eight Antennas**
M. H. Abu Nasr, H. M. Elkamchouchi, *Alexandria University, Egypt*

Session 28. Antenna Measurements

Monday, June 21 13:25-17:30

AP

Ferrante I

- Co-Chairs: Lawrence Williams, *Ansoft Inc., USA*
Michael Francis, *National Institute of Standards and Technology at Boulder, USA*
- 13:25 **Opening Remarks**
- 13:30 28.1 **Indirect Holographic Imaging of Antennas Using an Electronically Synthesised Slow-Wave**
D. Smith, M. Leach, *Northumbria University, England*; A. Kellner, *Fachhochschule Heilbronn, Germany*
- 13:50 28.2 **A Far-Field Transformation from Phaseless near-Field Data on Helicoidal Geometry**
S. Costanzo, G. Di Massa, *University of Calabria, Italy*
- 14:10 28.3 **Synthesis of DF Array Calibration Manifolds from Near-Field Measurements**
K. A. Struckman, *BAE Systems, USA*
- 14:30 28.4 **Measurements of Realized Diversity Gain of Active DECT Phones and Base-Stations in a Reverberation Chamber**
R. Bourhis¹, C. Orlenius², G. Nilsson³, S. Jinstrand³, P.-S. Kildal¹
¹*Chalmers University of Technology, Sweden*; ²*Bluetest AB, Sweden*; ³*Ascom Tateco AB, Sweden*
- 14:50 28.5 **A Solid Hand Phantom for Mobile Phones and Results of Measurements in Reverberation Chamber**
M. Lundmark¹, R. Serrano Calvo², P.-S. Kildal², C. Orlenius¹
¹*Bluetest AB, Sweden*; ²*Chalmers University of Technology, Sweden*
- 15:10 28.6 **Field Measurements Inside a Reverberation Chamber**
Y. Huang, J. T. Z. Huang, *Univ of Liverpool, UK*
- 15:30 28.7 **The Developments of Antenna Test Facilities at Da Yeh University**
D.-C. Chang, *Da Yeh University, Taiwan*
- 15:50 28.8 **Reduction of Clutter Contamination in Target Radar Cross-Section Measurements Using Independent Components Analysis**
J. W. Burns, N. S. Subotic, *Altarum Institute, USA*
- 16:10 28.9 **Practical Validation of Antenna Pattern Measurement Interference Cancellation Using a Correlation Technique**
P. S. Leather, J. D. Parsons, *Fizzle Technologies Limited, UK*; J. Romeu, S. Blanch, A. Aguasca, *Universitat Politecnica de Catalunya, Spain*
- 16:30 28.10 **Characterization of Non-Anechoic Chambers and Echo Cancellation for Antenna Measurement**
M. Rodriguez-Pino, S. Loredo, F. Las-Heras, *University of Oviedo, Spain*; T. K. Sarkar, *Syracuse University, USA*
- 16:50 28.11 **Measurement of Phase Centers of Rectangular Dielectric Rod Antennas**
J. Richter, *University of Erlangen, Germany*
- 17:10 28.12 **Probe Based MMW Antenna Measurement Setup**
T. Zwick, C. Baks, U. R. Pfeiffer, D. Liu, B. P. Gaucher, *IBM, USA*

Session 29. Broadband Antennas & Feeds

Monday, June 21 13:25-17:30

AP

Colton

Co-Chairs: Aluizio Prata, *University of Southern California, USA*
Yuanxun Wang, *University of California Los Angeles, USA*

- 13:25 Opening Remarks
- 13:30 29.1 **A Broadband CPW-Fed Arrowlike Printed Antenna**
W. Wang, S.-S. Zhong, X. L. Liang, *Shanghai University, China*
- 13:50 29.2 **Microstrip Line Fed Broadband Suspended Plate Antenna**
M. R. Ranjith, *Cochin University, India*; P. H. Rao, R. SivaRamaKrishnan, *SAMEER-Centre for Electromagnetics, India*
- 14:10 29.3 **Broadband Proximity-Coupled Microstrip Antenna**
S. Gao, A. Sambell, *University of Northumbria, UK*
- 14:30 29.4 **Single-Conductor Strip Higher Order Mode Broadband Leaky-Wave Antenna**
W. Hong, G.-Y. Chang, Y.-D. Lin, *National Chiao-Tung University, Taiwan*
- 14:50 29.5 **Broadband Slot Spiral Antenna with External Feed and Microstrip-to-Slotline Transition**
W.-Z. Wu, T.-H. Chang, J.-F. Kiang, *National Taiwan University, Taiwan*
- 15:10 29.6 **Broadband Printed Circuit Board Folded Dipole Antenna**
J. M. Yang, *Northrop Grumman Space Technology, USA*; A. Prata, *University of Southern California, USA*
- 15:30 29.7 **A Novel Broadband Antenna, the Low-Profile Dipole Planar Inverted Cone Antenna (LPdiPICA)**
S.-Y. Suh¹, W. Stutzman², W. Davis², A. Walther¹, J. Schiffer¹
¹*Intel Corporation, USA*; ²*Virginia Tech, USA*
- 15:50 29.8 **Electromagnetically Coupled Small Broadband Rectangular Disk-Loaded Monopole Antenna**
J.-H. Jung, Y.-H. Lee, I. Park, *Ajou University, Korea*
- 16:10 29.9 **Antenna Design with Control of Radiation Pattern and Frequency Bandwidth**
I. Pele, Y. Mahe, A. Chousseaud, S. Toutain, *IREENA, France*; P.-Y. Garel, *France Telecom R&D, France*
- 16:30 29.10 **A Broadband Rolled Edged Cavity Antenna**
R. B. Dybdal, D. E. Ping, J. T. Shaffer, L. U. Brown, *The Aerospace Corporation, USA*
- 16:50 29.11 **Radiating Beyond the Bandwidth Using Direct Antenna Modulation**
W. Yao, Y. Wang, *University of California, Los Angeles, USA*
- 17:10 29.12 **Dual Circular Polarization of Tilted Beam by a Single Arm Rectangular Spiral Antenna**
C. W. Jung, F. D. Flaviis, *University of California at Irvine, USA*

Session 30. Wide Bandwidth and Multiband Antenna

Monday, June 21 13:25-17:30

AP/URSI B

DeAnza III

Co-Chairs: Vaughn Cable, *Jet Propulsion Laboratory, USA*
Peter S. Hall, *University of Birmingham, United Kingdom*

- 13:25 Opening Remarks
- 13:30 30.1 **Dual Frequency Stacked-Patch Antenna for VHF/UHF**
V. P. Cable, *Caltech Jet Propulsion Laboratory, USA*
- 13:50 30.2 **Dual-Band Electrically Small Microstrip Antenna**
Y. R. Cha, C. S. Lee, *Southern Methodist University, USA*
- 14:10 30.3 **Dual-Band BroadBand Microstrip Antenna Inspired in the Sierpinski Fractal**
J. Anguera, *Fractus-Korea, Korea*; E. Martínez, C. Puente, C. Borja, J. Soler, *Fractus-Barcelona, Spain*
- 14:30 30.4 **Compact Multi-Band Antennas for Universal Mobile Applications**
S. Yarasi, T. Hebron, *Centurion Wireless Technologies Inc, Nebraska*

- 14:50 30.5 **Multi-Band Capacitively Loaded Magnetic Dipole**
G. Poilasne, L. Desclos, S. Rowson, Ethertronics, USA
- 15:10 30.6 **Wide and Tri-Band Microstrip LAN Antenna Design and GUI Tool Using a GA and FDTD**
L. A. Griffiths, Y. C. Chung, C. M. Furse, University of Utah, USA
- 15:30 30.7 **Investigation of the Effect of Fractal Shapes on the Broadband Behavior of 1-Dimensional Optimized Antennas**
N. Vasiloglou, D. Staiculescu, M. Tentzeris, Georgia Tech, USA
- 15:50 30.8 **Ultra Wideband Array Elements**
P. S. Hall, T. W. Hee, The University of Birmingham, UK; J. Perrisseaux, Ecole Polytechnique Federale de Lausanne, Switzerland
- 16:10 30.9 **Ferro-Electric Materials for Miniaturizing Broad-Band Antennas**
K. Buell, H. Mosallaei, K. Sarabandi, University of Michigan, USA
- 16:30 30.10 **Characteristics of Microstrip-Fed Printed Bow-Tie Antenna for Wideband Phased Array Systems**
A. A. Eldek, A. Z. Elsherbini, C. E. Smith, The University of Mississippi, USA
- 16:50 30.11 **Double-Sided Printed Bow-Tie Antenna for UWB Applications**
K. Kiminami, A. Hirata, T. Shiozawa, Osaka University, Japan
- 17:10 30.12 **A Modified Bow-Tie Slot Antenna Fed by a Coplanar Waveguide**
S.-Y. Chen, P. Hsu, National Taiwan University, Taiwan

Session 31. EBG Surfaces II

Monday, June 21 13:25-17:10

AP/URSI B: Joint Special Session

DeAnza II

Organizers: Nader Engheta, *University of Pennsylvania, USA*
Per-Simon Kildal, *Chalmers University of Technology, Sweden*

Co-Chairs: Nader Engheta, *University of Pennsylvania, USA*
Per-Simon Kildal, *Chalmers University of Technology, Sweden*

- 13:25 Opening Remarks
- 13:30 31.1 **Anomalous Behavior of the TEM Mode when Radiating from an Open-Ended Circular Waveguide with Ideal Hard Wall**
S. P. Skobelev, Joint-Stock Company "Radiophysika", Russia; P.-S. Kildal, Chalmers University of Technology, Sweden
- 13:50 31.2 **Miniaturized Dielectric-Loaded Rectangular Waveguides for Use in Multi-Frequency Arrays**
M. Ng Mou Kehn, P.-S. Kildal, S. P. Skobelev, Chalmers University of Technology, Sweden
- 14:10 31.3 **Quasi-TEM Waveguides Realized by Hard-FSS Walls**
A. Cucini, M. Caiazzo, P. Bennati, S. Maci, University of Siena, Italy
- 14:30 31.4 **A Beam Steering Antenna Controlled with a EBG Material**
P. Ratajczak, P.-Y. Garel, P. Brachat, France Telecom R&D, France
- 14:50 31.5 **Effect of Substrates on Planar Photonic Bandgap (PBG) structure**
M. N. Mollah, N. C. Karmakar, Nanyang Technological University, Singapore
- 15:10 31.6 **Omnidirectional Dielectric Electromagnetic Band Gap Antenna for Base Station of Wireless Network**
L. Freytag, E. Pointereau, B. Jecko, IRCOM (Institut de Recherche en Communications Optiques et Microondes), France
- 15:30 31.7 **Convoluted Elements for Electromagnetic Band Gap Structures**
S. W. Tse, B. Sanz Izquierdo, J. C. Batchelor, R. J. Langley, University of Kent, UK
- 15:50 31.8 **Optimization of Multi-band AMC Surfaces with Magnetic Loading**
D. J. Kern, D. H. Werner, P. L. Werner, The Pennsylvania State University, USA
- 16:10 31.9 **Miniaturized MIM CRLH Transmission Line Structure and Application to Backfire-to-Endfire Leaky-Wave Antenna**
M. Kang, C. Caloz, T. Itoh, University of California, Los Angeles, California
- 16:30 31.10 **A Spiral Antenna Array with an Electromagnetic Band-Gap Reflector**
H. Nakano, K. Hitosugi, J. Yamauchi, Hosei University, Japan

- 16:50 31.11 **Design of a Directive and Matched Antenna with a Planar EBG Structure**
H. Boutayeb, INRS Telecommunication, Canada; K. Mahdjoubi, A.-C. Tarot, IETR Antenna and Microwave, France
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Session 32. Switched-Beam Antenna Technology

Monday, June 21 13:25-15:30

AP

DeAnza I

Co-Chairs: Lot Shafai, *University of Manitoba, Canada*
John Papapolymerou, *Georgia Institute of Technology, USA*

- 13:25 Opening Remarks
- 13:30 32.1 **Polarizing Frequency of a Fluid Plasma Antenna Element**
M. Robinson, Syracuse Research Corporation, USA
- 13:50 32.2 **Spiral Antenna with Adaptive Radiation Pattern under Electronic Control**
A. Mehta, D. Mirshekar-Syahkal, University of Essex, UK
- 14:10 32.3 **Adaptive Microstrip Phase Shifter Using Ground Plane Slot Structures**
S. K. Sharma^{1,2}, L. Shafai³, C. Shafai¹, L. Shafai¹
¹*University of Manitoba, Canada; ²InfoMagnetics Technologies Corporation, Canada; ³Carleton University, Canada*
- 14:30 32.4 **A Switched-Beam Antenna Utilizing a Radial Guide with Coaxial Probes and a Dielectric Transition to Free Space**
J. Janapsatya, M. E. Bialkowski, The University of Queensland, Australia
- 14:50 32.5 **A Novel Switched-Sector Planar Antenna Using Parasitic Elements**
F. Chen, W. Chen, L. Yang, Tsinghua University, China
- 15:10 32.6 **Switch-Beam Microstrip Patch Antenna**
W. Wu, B. Z. Wang, S. Sun, University of Electronic Science and Technology of China, China

Session 33. Radome and Scattering Optimization

Monday, June 21 13:25-15:30

AP

Bonsai I

Co-Chairs: Mark Bushbeck, *University of Washington - Seattle, USA*
Odell Graham, *ATK Missile Systems Co., USA*

- 13:25 Opening Remarks
- 13:30 33.1 **Electromagnetic Scattering from a Two-State Phase-Switched Screen Using a Control Impedance**
M. D. Bushbeck, University of Washington, Seattle, USA
- 13:50 33.2 **Broadband Impedance Compensation for Ground Penetration Radar Antenna Using Genetic Algorithms**
Y. Yuan, C. H. Chan, F.-M. Kim, City University of Hong Kong, China
- 14:10 33.3 **Optimization of High Performance Constant Thickness Radome for Aerospace Vehicles**
J. Sunithamma, R. U. Nair, R. M. Jha, National Aerospace Laboratories, India
- 14:30 33.4 **Tuning of EM Performance for Streamlined Aircraft Radomes**
R. U. Nair, R. M. Jha, National Aerospace Laboratories, India
- 14:50 33.5 **Novel Design for a Monolithic Hybrid Variable Thickness Radome (Hy-VTR)**
R. U. Nair, R. M. Jha, National Aerospace Laboratories, India
- 15:10 33.6 **EM Performance Analysis of an a-Sandwich Cone-Ogive Hybrid Variable Thickness Radome**
R. U. Nair, R. M. Jha, National Aerospace Laboratories, India

Session 34. EMI/EMC Modeling/Validation Part II

Monday, June 21 13:25-15:30

AP/URSI B&E: Joint Special Session

Bonsai II

Organizers: Danilo Erricolo, *University of Illinois at Chicago, USA*
Robert Gardner, *Consultant, USA*

Co-Chairs: Danilo Erricolo, *University of Illinois at Chicago, USA*
Robert Gardner, *Consultant, USA*

- 13:25 Opening Remarks
- 13:30 34.1 **Electromagnetic Coupling and Interference Predictions Using the Frequency-Domain Physical Optics Method and the Time-Domain Finite-Element Method**
D. J. Riley, N. W. Riley, *Northrop Grumman Corporation, USA*; W. T. Clark III, H. Del Aguila, *Air Force Research Laboratory, USA*; R. Kipp, *SAIC / DEMACO, USA*
- 13:50 34.2 **Susceptibility of Digital IC's to Ringing EMI Events**
M. A. Bridgwood, *Clemson University, USA*
- 14:10 34.3 **Review of Empirical and Analysis Techniques to Derive Trends in EMI Effects Data**
R. L. Gardner, *Consultant, USA*
- 14:30 34.4 **Tradeoffs for Data Communication Protocols with Multiple Interfering Signals**
I. Kohlberg, R. Boling, *Institute for Defense Analyses, USA*
- 14:50 34.5 **Impact of Parameter Class Choices Within the Framework of Multivariate Logistic Regression Applied to the Analysis of EMI Effects Data**
C. A. Ropiak, *Envioneeering, Inc., USA*; P. R. Hayes, *Cemtach, USA*
- 15:10 34.6 **Effects of External EMI Pulses on Microprocessor Instruction Execution**
P. Mazumder, B. Wang, *The University of Michigan, USA*

Session 35. Random Media and Rough Surfaces

Monday, June 21 13:25-17:30

AP

Bonsai III

Co-Chairs: James West, *Oklahoma State University, USA*
Gary Brown, *Virginia Polytechnic Institute and State University, USA*

- 13:25 Opening Remarks
- 13:30 35.1 **Effect of Lag Correlations on the Statistical Modeling of Wave Propagation in a Complex Cavity**
L. L. Vahala, *Old Dominion University, USA*; T. X. Nguyen, *NASA Langley Research Center, USA*
- 13:50 35.2 **Equivalent Impedance of a Large Rough Surface at Low Grazing Angles**
Z. Lai, R. Janaswamy, *Uninversity of Massachusetts, USA*
- 14:10 35.3 **Polarization Ratios in Microwave Scattering from Spilling Breaker Water Waves at Moderate Incidence**
J. C. West, *Oklahoma State University, USA*
- 14:30 35.4 **On the Features of Spatial Spectrum of Scattered Electromagnetic Waves in a Random Absorbing Slab**
G. V. Jandieri¹, A. Ishimaru², G. D. Aburjania¹, V. G. Jandieri³
¹*Georgian Technical University, USA*; ²*Washington University, USA*; ³*Kyushu University, Japan*
- 14:50 35.5 **Traveltime and Intensity Statistics of the Pulsed Signals Backscattered by a Rough Surface**
I. M. Fuks, *Zel Technologies, LLC and NOAA/Environment Techn. Lab., USA*; O. A. Godin, *CIRE, University of Colorado and NOAA/Environment Techn. Lab., USA*
- 15:10 35.6 **New Physical and Mathematical Models for Generation of Large-Scale Internal Vortical Electric Fields in the Ionosphere**
G. V. Jandieri, *Georgian Technical University, USA*; G. D. Aburjania, K. Z. Chargazia, O. A. Kharshiladze, *I.Vekua Institute of Applied Mathematics, Tbilisi State University, USA*
- 15:30 35.7 **Modeling of Electromagnetic Wave Propagation and Absorption in Turbulent Flow**
V. G. Spitsyn, *Tomsk Polytechnic University, Russia*

- 15:50 35.8 **Long Distance Path-Loss Estimation for Wave Propagation Through a Forested Environment**
F. Wang, I.-S. Koh, K. Sarabandi, The University of Michigan, USA
- 16:10 35.9 **The Features of the Angular Spectrum of Multiply Scattered Radiation in Turbulent Collisional Magnetized Plasma**
G. V. Jandieri¹, A. Ishimaru², V. G. Gavrilenko¹, V. G. Jandieri³
¹*Georgian Technical University, USA; ²Washington University, USA; ³Kyushu University, Japan*
- 16:30 35.10 **Stochastic Model of Electromagnetic Wave Propagation in Periodic and Stratified Absorbing Media Inclusive a Semitransparent Object**
V. G. Spitsyn, Tomsk Polytechnic University, Russia
- 16:50 35.11 **Scattering and Emission from Inhomogeneous Vegetation Canopy by Using 3D-VRT Equation**
Y.-Q. Y. Jin, Fudan University, China
- 17:10 35.12 **Electric Dipole Excitation and Propagation of Electromagnetic Waves in a Conducting Medium**
C.-W. Wu, Taiwan Naval Academy, Taiwan; Y.-C. Kan, Mingdao University, Taiwan; H.-M. Lee, Independent Researcher, USA

Session 36. The Creation and Application of Interesting Models in EM

Monday, June 21 13:25-15:10

AP

Redwood

Co-Chairs: Richard Adler, *Naval Postgraduate School, USA*
Steven Best, *Air Force Research Laboratory/SNHA Hanscom AFB, USA*

- 13:25 Opening Remarks
- 13:30 36.1 **Static Modeling of Periodic Structures with Application to Braided Shields**
W. A. Johnson, L. K. Warne, L. I. Basilio, R. S. Coats, J. D. Kotulski, R. E. Jorgenson, Sandia National Laboratories, USA; J. B. Grant, A N T -S, USA
- 13:50 36.2 **A New 2-Cluster Model for Indoor UWB Channel Measurements**
S. Venkatesh, J. Ibrahim, R. M. Buehrer, Virginia Tech, USA
- 14:10 36.3 **Design of Magnetic Resonance Imaging (MRI) RF Coils by Using the Method of the Moments**
A. Rogovich, A. Monorchio, P. Nepa, G. Manara, University of Pisa, Italy; G. Giovannetti, L. Landini, Italian National Research Council, Italy
- 14:30 36.4 **The Field of a Vertical Antenna Above Inhomogeneous Ground**
C. J. Coleman, The University of Adelaide, Australia
- 14:50 36.5 **On Indirect Method of RCS Calculation of Conducting Targets in Random Media**
H. E. M. M. H. El-Ocla, Lakehead University, Canada; M. Tateiba, Kyushi University, Japan

Session 37. Propagation Modeling

Monday, June 21 13:25-17:10

URSI F

Ironwood

Co-Chairs: Stephen Burk, *Naval Research Laboratory-Monterey, USA*
Paul Frederickson, *Naval Postgraduate School, USA*

- 13:25 Opening Remarks
- 13:30 37.1 **Diurnal and Synoptic Impacts on Coastal Ocean Radio Refractivity in the Lee of a Cold Front**
E. H. Burgess, R. E. Marshall, Naval Surface Warfare Center - Dahlgren, USA; R. Rottier, The Johns Hopkins University Applied Physics Laboratory, USA
- 13:50 37.2 **The Relationship Between Modified Radio Refractivity and the Structure of the Atmospheric Boundary Layer-A Mathematical Bridge Between Radio and Atmospheric Scientists**
R. E. Marshall, E. H. Burgess, Naval Surface Warfare Center Dahlgren Division, USA; J. R. Rottier, Johns Hopkins University Applied Physics Laboratory, USA

- 14:10 37.3 **Rules of Thumb for Formation of Radar Surface Ducts**
J. R. Rottier, *Johns Hopkins University, USA*; R. E. Marshall, E. H. Burgess, *Naval Surface Warfare Center, USA*
- 14:30 37.4 **A Mesoscale Modeling Study of Wallops 2000 EM Refractivity Conditions**
S. D. Burk, T. Haack, *Naval Research Laboratory, USA*
- 14:50 37.5 **Coastal and Seasonal Variability of Marine Layer Electromagnetic Trapping Conditions**
T. Haack, S. D. Burk, *Naval Research Laboratory, USA*
- 15:10 37.6 **Predicting Low Altitude Radar Detection Ranges over the Ocean from Meteorological Data**
P. A. Frederickson, K. L. Davidson, *Naval Postgraduate School, USA*
- 15:30 37.7 **Uncertainty Analysis in the Refractivity from Clutter (RFC) Problem**
C. Yardim, P. Gerstoft, W. S. Hodgkiss, *Scripps Inst. of Oceanography, Univ. Cal. San Diego, USA*
- 15:50 37.8 **Effects of Rain on Millimeter-Wave (MMW) Line-of-Sight Communication: Time-Domain Analysis**
U. Ketprom, S. Jaruwatanadilok, Y. Kuga, A. Ishimaru, *University of Washington, Seattle, USA*
- 16:10 37.9 **Modeling of Time Reversal Propagation with Applications to Communication and Imaging**
L. Li, L. Carin, *Duke University, USA*
- 16:30 37.10 **Application of PDE Methods for the Analysis of Scattering from Irregular Surfaces in Urban Areas**
M. D. Casciato, W. Thiel, *EMAG Technologies, USA*; K. Sarabandi, *The University of Michigan, USA*
- 16:50 37.11 **Alleviation of Multipath Effects by Beacon Design**
J.-L. Chu, C.-F. Chou, J.-F. Kiang, *National Taiwan University, Taiwan*

Session 38. Microstrip Components, Circuits & Feeds

Monday, June 21 13:25-17:30

AP

Cottonwood

Co-Chairs: Safieddin Safavi-Naeini, *University of Waterloo, Canada*
William R. McGrath, *Jet Propulsion Laboratory, USA*

- 13:25 Opening Remarks
- 13:30 38.1 **An Improved Design of Microstrip Patch Antennas Using Compact Microstrip Resonant Cell**
Y. J. Sung, Y. Y. -S. Kim, *Korea University, Korea*
- 13:50 38.2 **The Frequency-Dependent Average Power Handling Capability of Metal-Insulator Semiconductor (MIS) Microstrip Interconnects**
W.-Y. Yin, X. Dong, Y. B. Gan, *National University of Singapore, Singapore*
- 14:10 38.3 **Degenerated TE_{x/y} Modes of Rectangular DR in MIC Environment and Their Application to Dual-Mode Bandpass Filter**
Y. Liu, S. Safavi-Naeini, *University of Waterloo, Canada*
- 14:30 38.4 **Network Analysis of Aperture-Coupled Cavity-Fed Microstrip Patch Antenna**
J. W. Shin, W. H. Kim, J. P. Kim, *Chung-Ang University, Korea*
- 14:50 38.5 **The Coupling Between Two TE₁₁₈-Mode Rectangular DR's in MIC Environment**
Y. Liu, S. Safavi-Naeini, S. K. Chaudhuri, *University of Waterloo, Canada*
- 15:10 38.6 **Analysis and Design of Terahertz HEB Mixers and Detectors**
P. Focardi, W. R. McGrath, *California Institute of Technology, USA*
- 15:30 38.7 **A Compact Integrated Coaxial V-Band Bandpass Filter**
J. R. Reid, R. T. Webster, *Air Force Research Laboratory, USA*
- 15:50 38.8 **Novel Distributed Circuit Parameters Model for Coplanar Waveguide to Microstrip Transition**
J. Hong, B.-Z. Wang, Y. Zhang, *University of Electronic Science and Technology of China, China*
- 16:10 38.9 **Improved Circuit Model for DGS Based Lowpass Filter**
A. Boutejdar¹, A. Abdel-Rahman¹, A. K. Verma², G. E. Nadim³, A. S. Omar¹
¹Otto-Von-Gericke University, Germany; ²University of Delhi, India; ³Cairo University - Fayoum Branch, Egypt
- 16:30 38.10 **T-Junction and Other Microstrip Discontinuities, up to Radiation Frequencies, as Joining of Open-Circuits**
W. Tang, *Nanjing University of Science and Technology, China*; Y. L. Chow, *University of Waterloo, Canada*
- 16:50 38.11 **An Efficient Full-Wave Model for Characteristic Parameter Extraction of CPWs**
B. Liu, R. Jin, Y. Fan, J. Geng, *Shanghai Jiao Tong Univ., China*

- 17:10 38.12 **Experimental Consideration on Tapered Slot Antenna Divided into Radiator and Feeding Circuit**
A. Matsui, *Saitama Institute of Technology, Japan*
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Session 39. FDTD Modeling of Antennas

Monday, June 21 15:30-17:30

AP

San Carlos II

Co-Chairs: Balasubramaniam Shanker, *Michigan State University, USA*
David Steich, *Lawrence Livermore National Laboratory, USA*

- 15:30 39.1 **Investigation of Instability Characteristics Arising in the FDTD Simulation of Electrically Large Antenna Arrays**
T. Su, N.-T. Huang, Y. Liu, W. Yu, R. Mittra, *Penn State Univ., USA*
- 15:50 39.2 **Improvement of the Accuracy in FDTD Analysis of Dipole and Square Loop Antennas by Utilizing a Quasi-Static Approximation**
P. Pongpaibool, T. Uno, T. Arima, *Tokyo University of Agriculture and Technology, Japan*
- 16:10 39.3 **FDTD Analysis of Printed Antenna on Thin Dielectric Sheet Including Quasi-Static Approximation**
T. Arima, T. Uno, M. Takahashi, *Tokyo University of Agriculture and Technology, Japan*
- 16:30 39.4 **Design of Folded Monopole Array Antenna Used for Large Area Plasma Production**
H. Sato¹, K. Tamashiro¹, K. Sasaki¹, T. Takagi², M. Ueda², Y. Watabe², K. Sawaya¹
¹Tohoku University, Japan; ²Ishikawajima-Harima Heavy Industries Co. Ltd., Japan
- 16:50 39.5 **A Robust Parallel Conformal FDTD Algorithm and Its Application to Electrically Large Antenna Array Simulation**
W. Yu, Y. Liu, T. Su, N.-T. Huang, R. Mittra, *Penn State Univ., USA*
- 17:10 39.6 **Solid Modeling of Mobile Phone for Accurate SAR Estimation**
K.-W. Lee¹, W.-T. Kim¹, J.-Y. Sung², H.-T. Oh², J.-G. Yook¹
¹Yonsei University in Seoul, Korea; ²Ministry of Information and Communication Radio Research Laboratory, Korea

Session 40. Antennas for Wireless Application

Monday, June 21 15:30-17:30

AP

San Carlos III

Co-Chairs: Lot Shafai, *University of Manitoba, Canada*
Gaetano Marrocco, *Università di Roma Tor Vergata, Italy*

- 15:30 40.1 **Radiation Performance Improvement of Microstrip Antennas by a Mounted Horn and R-card for the Car Communication Applications**
Y.-T. Hsiao, H.-T. Chou, C.-Y. Chung, *Yuan Ze University, Taiwan*
- 15:50 40.2 **A Study on the Variable Radiation Pattern Antenna Using a Parasitic Slot**
M. Higaki, N. Odachi, S. Sekine, H. Shoki, *TOSHIBA Corp., Japan*
- 16:10 40.3 **Investigations on Beam Focusing Properties of Circular Monopole Array Antenna on a Finite Ground Plane**
S. K. Sharma, L. Shafai, *University of Manitoba, Canada*
- 16:30 40.4 **Helical Array Antennas with High Efficiency, Wide Frequency Bandwidth and Simple Structure**
T. Noro, Y. Kazama, *Japan Radio Co., Ltd., Japan*
- 16:50 40.5 **Investigation on Pattern Distortion of Landscape-Compliant 3G Base-Station Antennas**
G. Marrocco, S. Finistauri, *Università di Roma TOR VERGATA, Italy*; M. Motta, G. D'orio, S. De Polo, *H3G, Italy*
- 17:10 40.6 **A Novel Low-Cost Chip Antenna for Short Range Radio Applications**
P. B. Webster, *Embedded Antenna Design Ltd, UK*

Session 41. Spirals, Annular Rings, Miscellaneous Circular Structures

Monday, June 21 15:30-17:30

AP

Ferrante III

Co-Chairs: David Jackson, *University of Houston, USA*
Hao Xu, *University of Houston, USA*

- 15:30 41.1 **A Stacked-Patch Reduced Surface Wave Antenna**
H. Xu, D. R. Jackson, J. T. Williams, R. L. Chen, *University of Houston, USA*; L. I. Basilio, *Sandia National Laboratories, USA*
- 15:50 41.2 **Archimedean Microstrip Spiral Antenna Loaded by Chip Resistors Inside Substrate**
L. Schreider, X. Begaud, *GET Telecom paris CNRS UMR 5141, France*; M. Soiron, B. Perpere, *Thales Systèmes Aéroportés, France*
- 16:10 41.3 **A Low Frequency Spiral C-patch Antenna Design for Automotive Application**
M.-C. M. Liang, *National University of KaoHsiung, Taiwan*; K.-C. Huang, M.-L. Lo, *I-Shou University, Taiwan*
- 16:30 41.4 **Analysis of Concentric Slot Ring Antennas Using DOE and FDA**
C. A. Jaramillo-Henao, R. A. Rodriguez Solís, D. Rosario-Román, D. González-Barreto, *University of Puerto Rico, Puerto Rico*
- 16:50 41.5 **A Novel Printed Leaky-Wave 'Bull-Eye' Antenna with Suppressed Surface-Wave Excitation**
P. Baccarelli, P. Burghignoli, G. Lovat, S. Paulotto, *"La Sapienza" University of Rome, Italy*
- 17:10 41.6 **Analysis and Design of Microstrip Antenna for Rectenna of in-Pipe Micromachine Using FDTD Method**
J.-S. Xu, D.-M. Xu, X.-X. Yang, C.-L. Xu, *Shanghai University, China*

Session 42. Narrowband Dielectric Resonator Antennas

Monday, June 21 15:30-17:30

AP

Ferrante II

Chair: Stuart Long, *University of Houston, USA*

- 15:30 42.1 **Frequency Tuning of the Dielectric Resonator Antenna Using a Loading Disk**
H. K. Ng, K. W. Leung, *City University of Hong Kong, China*
- 15:50 42.2 **Frequency Design of the Circularly Polarized Dielectric Resonator Antenna**
K. K. So, K. W. Leung, H. K. Ng, *City University of Hong Kong, China*
- 16:10 42.3 **A Circularly Polarized Rectangular Dielectric Resonator Antenna with a Parasitic Patch**
B. Li, H. K. Ng, K. W. Leung, *City University of Hong Kong, China*
- 16:30 42.4 **CPW-Fed Rectangular Ceramic Dielectric Resonator Antennas with High Profile**
S. M. Deng, *TA-HWA Institute of Technology, Taiwan*; C. L. Tsai, *Ming Chuan University, Taiwan*; C. W. Chiu, *National I-Lan University, Taiwan*; S. F. Chang, *Feng Chia University, Taiwan*
- 16:50 42.5 **CPW-Fed Dual Rectangular Ceramic Dielectric Resonator Antennas through Inductively Coupled Slots**
S. M. Deng, *TA-HWA Institute of Technology, Taiwan*; C. L. Tsai, *Ming Chuan University, Taiwan*; C. W. Chiu, *National I-Lan University, Taiwan*; S. F. Chang, *Feng Chia University, Taiwan*
- 17:10 42.6 **Array of Perforated Dielectric Resonator Antennas**
A. Petosa, S. Thirakoune, A. Ittipiboon, *Communications Research Centre Canada, Canada*

Session 43. Reconfigurable Apertures and Novel Beamsteering Techniques

Monday, June 21 15:30-17:10

URSI B

DeAnza I

Co-Chairs: Jennifer T. Bernhard, *University of Illinois at Urbana-Champaign, USA*
James Schaffner, *HRL Laboratories LLC, USA*

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- 15:30 43.1 **Dual Band Reconfigurable Slot Antennas Using Lumped Elements**
N. Behdad, K. Sarabandi, *University of Michigan, USA*
- 15:50 43.2 **A Pattern Reconfigurable Microstrip Antenna Using Solid State Switches**
S. Zhang, J. T. Bernhard, *University of Illinois at Urbana-Champaign, USA*
- 16:10 43.3 **Design and Analysis of Switching Circuits for Reconfigurable Antennas**
S. Iyer, R. G. Rojas, *The Ohio State University, USA*
- 16:30 43.4 **Simplicity Study for a Self-Structuring Antenna in an Automobile Environment**
B. T. Perry, E. J. Rothwell, *Michigan State University, USA*; J. E. Ross, *John Ross & Associates, USA*; L. L. Nagy, *Delphi Research Labs, USA*
- 16:50 43.5 **Design of Focal Plane Arrays for Lens-based Scanning Systems**
C. Barth, A. Abbaspour-Tamijani, K. Sarabandi, *University of Michigan, USA*
-

Session 44. Optimization Theory and Applications

Monday, June 21 15:30-17:30

AP

Bonsai I

Co-Chairs: Branko Kolundzija, *University of Belgrade, Serbia*
Samir El-Ghazaly, *University of Tennessee - Knoxville, USA*

- 15:30 44.1 **On The Design and Optimization of Waveguides Using Evolutionary Approaches**
Y. A. Hussein, *Stanford University, USA*; S. M. El-Ghazaly, *University of Tennessee, USA*
- 15:50 44.2 **Adaptive Random Search for Antenna Optimization**
D. I. Olcan, B. M. Kolundzija, *Faculty of Electrical Engineering, Serbia*
- 16:10 44.3 **Sensitivity Analysis and Optimization Utilizing an Approximate Auxiliary Problem**
S. M. Ali, N. K. Nikolova, M. H. Bakr, *McMaster University, Canada*
- 16:30 44.4 **Near to Far-Field Transformation Using GA Based Optimization: Real Versus Binary Encoding Schemes**
J. R. Perez, J. Basterrechea, *University of Cantabria, Spain*
- 16:50 44.5 **Application of a Real-Valued GA to Antenna Far-Field Pattern Reconstruction**
J. R. Perez, J. Basterrechea, *University of Cantabria, Spain*
- 17:10 44.6 **Derivation of Source Fields from Power Density Distributions**
A. R. Keith, *The Boeing Company, USA*; A. Prata, *University of Sourthern California, USA*
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Session 45. Planar Structures - EMI & Filters

Monday, June 21 15:30-17:30

AP/URSI A

Bonsai II

Co-Chairs: Nemai C. Karmakar, *Nanyang Technological University, Singapore*
Thomas X. Wu, *University of Central Florida, USA*

- 15:30 45.1 **Analytical Modeling of Irregularly Shaped Power Planes for Cavity Resonances**
J. D. McFiggins, J. Venkataraman, *Rochester Institute of Technology, USA*
- 15:50 45.2 **Application of Textured Ground Planes in Power Distribution System of High-Speed Digital Circuits**
R. Abhari, *McGill University, Canada*
- 16:10 45.3 **New EMI Shielding Approaches Using Electromagnetic Bandgap Structures**
B. Mohajer-Iravani, O. M. Ramahi, *University of Maryland, USA*
- 16:30 45.4 **On the Enhancement of Wirebond Package Bandwidth Using Double Bonding Technique**
M. N. Abdulla, *Intel Corporation, USA*
- 16:50 45.5 **Accurate Bonding Wire Modeling for SAW Cellular Duplexer**
H. Dong, T. X. Wu, *University of Central Florida, USA*; B. P. Abbott, *SAWTEK, Inc., USA*
- 17:10 45.6 **A Novel Design of Multi-Section Compact Planar Bandpass Filter**
N. C. Karmakar¹, R. L. L. Ling^{1,2}
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Session 46. EBG/PBG - Based Antennas and Components

Tuesday, June 22 7:55-12:00

AP/URSI B: Joint Special Session

San Carlos I

Organizers: Karu Esselle, *Macquarie University, Australia*
Raj Mittra, *Pennsylvania State University, USA*

Co-Chairs: Karu Esselle, *Macquarie University, Australia*
Raj Mittra, *Pennsylvania State University, USA*

- 7:55 Opening Remarks
- 8:00 46.1 **Optimization and Fundamental Limits of Tunable Textured Surface Antennas**
D. F. Sievenpiper, HRL Laboratories LLC, USA
- 8:20 46.2 **Woodpile EBG Resonator Antenna With Double Slot Feed**
A. R. Weily, K. P. Esselle, Macquarie University, Australia; B. C. Sanders, *University of Calgary, Canada*; T. S. Bird, *CSIRO, Australia*
- 8:40 46.3 **Techniques for Controlling the Defect Frequencies of Electromagnetic Bandgap (EBG) Superstrates for Dual-band Directivity Enhancement of a Patch Antenna**
Y. J. Lee¹, J. Yeo², K. D. Ko², R. Mittra², Y. Lee², W. S. Park¹
¹*Pohang University of Science and Technology, Korea*; ²*The Pennsylvania State University, USA*
- 9:00 46.4 **A Broadband Open-Sleeve Dipole Antenna Mounted Above a Tunable EBG AMC Ground Plane**
M. G. Bray, D. H. Werner, Pennsylvania State University, USA
- 9:20 46.5 **Multifrequency and Beam Steered Electromagnetic Band Gap Antennas**
L. Leger, T. Monediere, M. Thevenot, B. Jecko, IRCOM CNRS UMR 6615 LIMOGES UNIVERSITY, France
- 9:40 46.6 **Artificial Impedance Surfaces as Near-Field Screens**
S. Maslovski, P. Ikonen, M. Kärkkäinen, C. Simovski, S. Tretyakov, V. Denchev, Helsinki University of Technology, Finland
- 10:00 46.7 **A Low Profile Monopole Antenna Using a Dumbbell EBG Structure**
A. Yu, X. Zhang, Tsinghua University, China
- 10:20 46.8 **Metalldielectric Arrays Without Vias as Artificial Magnetic Conductors and Electromagnetic Band Gap Surfaces**
A. P. Feresidis, G. Goussetis, J. C. Vardaxoglou, *Loughborough University, UK*
- 10:40 46.9 **Cylindrical Electromagnetic Band Gap Structures for Base Station Antennas**
G. K. Palikaras, A. P. Feresidis, J. C. Vardaxoglou, Loughborough University, UK
- 11:00 46.10 **A Novel Design Technique for Ultra-Thin Tunable EBG AMC Surfaces**
D. J. Kern¹, M. J. Wilhelm², D. H. Werner¹, P. L. Werner¹
¹*The Pennsylvania State University, USA*; ²*Scipario, Inc, USA*
- 11:20 46.11 **Fundamental Properties of Source-Excited Field at the Interface of a 2D EBG Material**
F. Capolino, University of Siena, Italy; D. R. Jackson, D. R. Wilton, *University of Houston, USA*
- 11:40 46.12 **A Microstrip Phase Shifter Using Ferroelectric Electromagnetic Bandgap Ground Plane**
D. Kim, M. Kim, S.-W. Kim, Korea University, Korea

Session 47. Fast and Parallelized Methods

Tuesday, June 22 7:55-12:00

AP

San Carlos II

Co-Chairs: Stephen Gedney, *University of Kentucky, USA*
Jin-Fa Lee, *The Ohio State University, USA*

- 7:55 Opening Remarks
- 8:00 47.1 **Fast Window Accelerated SDA Evaluation for the Propagation of Multi-layer Interconnect**
T. Yu, Sigrity Inc., USA
- 8:20 47.2 **A New MultiLevel Green's Function Interpolation Method for Large Scale EM Simulation in RF IC**
W. Hao Gang, C. Chi Hou, T. Leung, City University of Hong Kong, China
- 8:40 47.3 **Fast Full-wave Analysis of Conductor-Loaded Rectangular Cavity Resonators Using Surface Integral Equation and Moment Method**
A. Borji, S. Safavi-Naeini, University of Waterloo, Canada
- 9:00 47.4 **Towards a PML-Based MLFMA for Planar Microwave Circuits**
D. Vande Ginste¹, E. Michielssen², F. Olyslager¹, D. De Zutter¹
¹Ghent University, Belgium; ²University of Illinois at Urbana-Champaign, USA
- 9:20 47.5 **A Broadband Multilevel Fast Multipole Algorithm**
L. Xuan, A. Zhu, R. J. Adams, S. D. Gedney, University of Kentucky, USA
- 9:40 47.6 **Fast, High-order, Hybrid Integral Equation Solver for Electromagnetic Scattering**
A. Zhu, S. D. Gedney, C. Lu, University of Kentucky, USA
- 10:00 47.7 **An Improved Greengard-Rokhlin's Fast Multipole Algorithm for the Computation of Scattering from Many Conducting Cylinders**
N. Nakashima, M. Tateiba, Kyushu University, Japan
- 10:20 47.8 **An O(N) Multilevel Solver for Dense Method of Moment Systems in Electrostatic Applications**
N. A. Ozdemir, J.-F. Lee, The Ohio State University, USA
- 10:40 47.9 **Use of Analytical Methods to Improve the Efficiency of a Full-Wave, Integral-Equation-Based Simulator**
Z. Zhu, X. Wang, S. L. Dvorak, J. L. Prince, University of Arizona, USA
- 11:00 47.10 **Watershed Load Balancing Technique for Distributed Memory Parallelization of Fast Multipole Methods with near-Field Preconditioning**
C. R. Waltz, M. A. Carr, The Ohio State University, USA
- 11:20 47.11 **Spherical Patch Discretization of k-Space for Improved Interpolation and Parallelization of the Multilevel Fast Multipole Method**
M. A. Carr, J. L. Volakis, The Ohio State University, USA
- 11:40 47.12 **Partly Approximate Iteration Technique for Accelerating CG-MLFMA Solution**
H. Jun, N. Z. Ping, L. Lin, W. Jun, Z. G. Xian, University of Electronic Science and Technology of China, China

Session 48. Antennas and Propagation in MIMO Systems I

Tuesday, June 22 7:55-12:00

AP: Special Session

San Carlos III

Organizers: Werner Wiesbeck, *University of Karlsruhe, Germany*
Michael Jensen, *Brigham Young University, USA*

Co-Chairs: Werner Wiesbeck, *University of Karlsruhe, Germany*
Michael Jensen, *Brigham Young University, USA*

- 7:55 Opening Remarks
- 8:00 48.1 **Wave Propagation and Slowing the Time-Fluctuating MIMO Channel**
D. Chizhik, J. Ling, R. A. Valenzuela, Lucent Technologies, USA
- 8:20 48.2 **MIMO Capacity for Realistic Wireless Communications Environments**
Z. Yun, M. F. Iskander, University of Hawaii, USA
- 8:40 48.3 **Application of Mellin Transform in the Evaluation of the Ergodic Capacity of Certain MIMO Systems**
R. Janaswamy, University of Massachusetts, USA
- 9:00 48.4 **Impact of Smart Antenna Designs on Network Throughput and BER**
C. A. Balanis, A. S. Spanias, T. M. Duman, J. M. Capone, Arizona State University, USA
- 9:20 48.5 **Quality Measures and Examples of Arrays for MIMO in Handheld Devices**
C. Waldschmidt, W. Wiesbeck, IHE, Germany

- 9:40 48.6 **An Investigation of Pattern Correlation and Mutual Coupling in MIMO Arrays**
I. J. Craddock, G. S. Hilton, P. Urwin-Wright, University of Bristol, UK
- 10:00 48.7 **A Model for Describing Mutual Coupling in Uniform Circular Arrays and Its Application to DOA Estimation**
H. Rogier, Ghent University, Belgium; E. Bonek, Technische Universitaet Wien, Austria
- 10:20 48.8 **Rigorous Modeling of Antenna and Circuit Coupling in MIMO Systems: Application to Handheld Devices**
M. L. Morris, M. A. Jensen, Brigham Young University, USA
- 10:40 48.9 **Electromagnetic Characterization of MIMO Antennas including Coupling using Classical Embedded Element Pattern and Radiation Efficiency**
P.-S. Kildal, Chalmers University of Technology, Sweden; K. Rosengren, Flextronics Design, Sweden
- 11:00 48.10 **A 16 by 32 Wideband Multichannel Sounder at 5 GHz for MIMO**
J. B. Andersen, J. O. Nielsen, G. F. Pedersen, K. Olesen, P. C. F. Eggers, E. H. Sorensen, Aalborg University, Denmark; S. Denno, DoCoMo-Eurolabs, Germany
- 11:20 48.11 **A MIMO System with Reciprocal Transceivers for the Time-Division Duplex Mode**
V. Jungnickel, U. Krueger, G. Istoc, T. Haustein, C. V. Helmolt, Fraunhofer Institute for Telecommunications, Heinrich-Hertz-Institut, Germany
- 11:40 48.12 **Experimental MIMO Propagation Modeling and Antenna System Evaluation**
P. Vainikainen, K. Sulonen, J. Kivinen, P. Suvikunnas, L. Vuokko, J. Salo, V.-M. Kolmonen, X. Zhao, H. El-Sallabi, Helsinki University of Technology, Finland

Session 49. UWB Systems Applications, Propagation & Measurements

Tuesday, June 22 7:55-12:00

AP

San Carlos IV

Co-Chairs: Daniel H. Schaubert, *University of Massachusetts at Amherst, USA*
Douglas J. Riley, *Northrup Grumman Corporation, USA*

- 7:55 Opening Remarks
- 8:00 49.1 **Cross-Correlation Back Projection for UWB Radar Imaging**
S. Foo, S. Kashyap, Defence Research & Development Canada, Canada
- 8:20 49.2 **Development of an Ultra Wideband Ground Penetrating Radar (UWB GPR) for Nondestructive Testing of Underground Objects**
Y.-J. Park, S.-B. Cho, K.-H. Kim, Korea Electrotechnology Research Institute, Korea; D.-G. Youn, Microline Co. LTD, Korea
- 8:40 49.3 **Efficient and Practical Pulses for Dipole Antenna UWB Link**
A. O. Borysenko, D. H. Schaubert, University of Massachusetts at Amherst, USA
- 9:00 49.4 **Target Detection and Tracking using a UWB Sensor Web**
R. Palaniappan, G. Schiavone, P. Wahid, E. VanDoorn, J. Tracy, University of Central Florida, USA
- 9:20 49.5 **The Fractal Array and the Fibonacci Sierpinski Gasket**
K. Barkeshli, K. Salimi, R. Toghraee, Sharif University of Technology, Iran
- 9:40 49.6 **Modeling Omnidirectional Small Antennas for UWB Applications**
S. B. Wang, A. M. Niknejad, R. W. Brodersen, University of California, USA
- 10:00 49.7 **Advanced Time-Domain Processing of Aperture Antenna Field**
M. Ciattaglia, G. Marrocco, Università di Roma TOR VERGATA, Italy
- 10:20 49.8 **Frequency-Domain Measurement of Indoor UWB Propagation**
A. Bayram, A. M. Attiya, A. Safaai-Jazi, S. M. Riad, Virginia Polytechnic Institute and State University, USA
- 10:40 49.9 **Interference Mitigation in Transmitted-Reference UWB Receivers**
F. U. Dowla, F. Nekoogar, A. Spiridon, Lawrence Livermore National Laboratory, USA
- 11:00 49.10 **On Orthogonal Multi-Pulse Transmission over the UWB Multi-Path Channel**
S. Barkeshli, Opelcomm Inc., USA
- 11:20 49.11 **Ultra-Wideband (UWB) Incidence on Multiple Dielectric Interfaces**
K. Heidary, Alabama A&M University, USA
- 11:40 49.12 **Ultra-Wideband (UWB) Antenna Measurements Using Vector Network Analyzer**
S. Licul, W. A. Davis, Virginia Polytechnic Institute and State University, USA

Session 50. Antenna, Chamber, and Array Characterization

Tuesday, June 22 7:55-10:00

AP/URSI A

Ferrante III

Co-Chairs: William Davis, *Virginia Polytechnic Institute and State University, USA*
Amir Zaghloul, *Virginia Polytechnic Institute and State University, USA*

- 7:55 Opening Remarks
- 8:00 50.1 **Two-Port Measurement Technique of Balanced Antenna Radiation Patterns**
K. Takamizawa, W. A. Davis, *Virginia Polytechnic Institute and State University, USA*
- 8:20 50.2 **An Automated Cylindrical Near-Field Measurement and Analysis System for Radome Characterization**
S. R. Mishra, M. J. Giles, *Canadian Space Agency, Canada*
- 8:40 50.3 **Comparisons of Antenna Radiation Measurement Techniques Inside an Anechoic Chamber with a Limited Space**
Y.-T. Hsiao, Y.-C. Lu, H.-T. Chou, *Yuan Ze University, Taiwan*
- 9:00 50.4 **A Method of Moments Solution of a 2D Reverberation Chamber using G1DMULT and Asymptotic Extraction**
K. Karlsson, J. Carlsson, *SP Swedish National Testing and Research Institute, Sweden*; U. Carlberg, P.-S. Kildal, *Chalmers University of Technology, Sweden*
- 9:20 50.5 **Transmission in Cut-Off Hole Arrays**
M. Beruete, F. Falcone, M. Sorolla, *Universidad Publica de Navarra, Spain*; I. Campillo, J. Dolado, *Labein Centro Tecnologico, Spain*; L. Martin-Moreno, *Universidad de Zaragoza, Spain*; F. Garcia-Vidal, *Universida Autonoma de Madrid, Spain*
- 9:40 50.6 **A Waveguide Frequency Doubler using Patch Antennas on a Multi-Layered Substrate**
H. J. Park, M. Kim, *Korea University, Korea*; J. Hacker, *Rockwell Scientific Company, USA*

Session 51. Optical and RF Devices

Tuesday, June 22 7:55-12:00

URSI D

Ferrante II

Co-Chairs: Wilson Pearson, *Clemson University, USA*
Mostafa Abdulla, *Intel Corporation, USA*

- 7:55 Opening Remarks
- 8:00 51.1 **Control of Coupling from a Micro Ring Laser Formed Coaxially on a Optical Fiber**
R. Baktur, L. W. Pearson, J. M. Ballato, *Clemson University, USA*
- 8:20 51.2 **High-Sensitivity, Millimeter-Wave Detection via Optical Modulation and Carrier Suppression**
C. A. Schuetz¹, S. K. Lohokare¹, S. Deliwala², D. W. Prather¹
¹*University of Delaware, USA*; ²*Light Matters, Inc., USA*
- 8:40 51.3 **Efficient Dynamic Analysis of Liquid Crystal Devices**
H. Wang, T. X. Wu, L. Zheng, S.-T. Wu, *University of Central Florida, USA*
- 9:00 51.4 **The Effect of Substrate Material and Isolation Technique on the Noise Coupling for RF and Mixed-Signal System On-A-Chip (SOC)**
J. Chao, M. N. Abdulla, *Intel Corporation, USA*
- 9:20 51.5 **Green's Function Analysis of an Inhomogeneous Microstrip Circulator**
J. L. Young, C. M. Johnson, *University of Idaho, USA*
- 9:40 51.6 **Enhanced Transmission of Transient Pulses Through Plates Perforated by Subwavelength Holes**
V. Lomakin, E. Michielssen, *University of Illinois at Urbana Champaign, USA*
- 10:00 51.7 **Slot Based Electromagnetic Band-Gap Structures for Surface Wave Suppression**
N. Llombart, A. Neto, G. Gerini, *TNO-FEL, The Netherlands*; P. de Maagt, *ESA-ESTEC, The Netherlands*

- 10:20 51.8 **Micromilled Dielectric PBG Self-Collimation Devices in Millimeter-Wave Regime**
Z. Lu, C. A. Schuetz, C. Chen, S. Shi, D. W. Prather, *University of Delaware, USA*
- 10:40 51.9 **Design and Simulation of a Cryogenic Electrical Motor**
L. Zheng¹, T. X. Wu¹, J. Vaidya², D. Acharya¹, K. Murty¹, L. Zhao¹, C. H. Ham¹, K. B. Sundaram¹, J. Kapat¹,
L. Chow¹
¹*University of Central Florida, USA*; ²*Electrodynamics Associates, USA*
- 11:00 51.10 **Design of Multilayered Ring Filters**
C.-F. Chou, J.-L. Chu, J.-F. Kiang, *National Taiwan University, Taiwan*
- 11:20 51.11 **The Enhancement of Electromagnetic Coupling Between the Primary and Secondary Spirals of on-Chip Symmetrical Transformers**
W.-Y. Yin, L. W. Li, S. J. Pan, *National University of Singapore, Singapore*
- 11:40 51.12 **A Multi-Band Sub-Harmonic Self-Oscillating Mixer with Conversion Gain Enhancement**
L. Chiu, T. Y. Yum, Q. Xue, C. H. Chan, *City University of Hong Kong, China*

Session 52. Implanted Antennas

Tuesday, June 22 7:55-10:00

AP/URSI K

Ferrante I

Chair: Rainee N. Simons, *NASA Glenn Research Center, USA*

- 7:55 Opening Remarks
- 8:00 52.1 **Low-profile Antennas for Implantable Medical Devices: Optimized Designs for Antennas/Human Interactions**
J. Kim, Y. Rahmat-Samii, *University of California, Los Angeles, USA*
- 8:20 52.2 **Validation of Radio Frequency Telemetry Concept in the Presence of Biological Tissue-like Stratified Media**
F. A. Miranda, R. N. Simons, *NASA Glenn Research Center, USA*; D. G. Hall, *Zin Technologies, Inc., USA*
- 8:40 52.3 **Printed Multi-Turn Loop Antenna for RF Bio-Telemetry**
R. N. Simons¹, D. G. Hall², F. A. Miranda¹
¹*NASA Glenn Research Center, USA*; ²*ZIN Technologies, Inc., USA*
- 9:00 52.4 **Implementation of the Thin-Strut FDTD Method for Dispersive Media in Biomedical Telemetry Applications**
S. Schmidt, G. Lazzi, *North Carolina State University, USA*
- 9:20 52.5 **A Study of the Performance of the Data Telemetry Link for a Retinal Prosthesis Using Extremely Compact Wire Antennas**
K. Gosalia, G. Lazzi, *North Carolina State University, USA*
- 9:40 52.6 **Comparison of Helical and Microstrip Antennas Imbedded in Lossy Dielectric Using Genetic Algorithms**
P. Soontornpipit, R. Bylapudi, C. Furse, Y. C. Chung, *University of Utah, USA*

Session 53. High Frequency Techniques

Tuesday, June 22 7:55-12:00

AP/URSI B

Colton

Co-Chairs: Robert J. Burkholder, *The Ohio State University, USA*
Paul Hussar, *Alion Science and Technology, USA*

- 7:55 Opening Remarks
- 8:00 53.1 **Application of the Complex Source Point Method for Analyzing the Diffraction of an Electromagnetic Gaussian Beam by a Curved Wedge Using UTD Concepts**
T. Lertwiriyaprapa, P. H. Pathak, K. Tap, R. J. Burkholder, *Ohio State University, USA*

- 8:20 53.2 **A Numerical Approach Utilizing GBs for the Efficient Analysis of EM Scattering by Large Multiple Plate Structures**
K. Tap, P. H. Pathak, R. J. Burkholder, T. Lertwiriyaprapa, *Ohio State University, USA*
- 8:40 53.3 **Calculation of the near-Field from Axial Symmetric Apertures Using Gaussian-like Discretization of the Aperture Field**
J. R. Costa, C. A. Fernandes, *Instituto de Telecomunicações, Portugal*
- 9:00 53.4 **A Novel GTD Ray Analysis for the Collective Radiation from Large Finite Cylindrical Conformal Antenna Arrays**
P. Janpugdee, P. H. Pathak, *The Ohio State University, USA*
- 9:20 53.5 **An Asymptotic Green's Function Representation for Fields in the Vicinity of an Arbitrary Convex Multilayer Coated Conducting Surface**
P. E. Hussar, *Alion Science and Technology, USA*
- 9:40 53.6 **Planar Phased Array Green's Function for an Angular Sector of Dipoles Embedded in a Dielectric Multilayer; a Hybrid (Complex-Source)-Asymptotic Approach**
A. Polemi, F. Mariottini, M. Giannettini, S. Maci, *University of Siena, Italy*
- 10:00 53.7 **High Frequency Double Diffraction at the Edges of an Impedance Flat Plate**
A. Toccafondi¹, M. Albani², R. Tiberio¹
¹*University of Siena, Italy*; ²*University of Messina, Italy*
- 10:20 53.8 **A Time Domain Incremental Theory of Diffraction (TD-ITD) and Its Reduction to TD-UTD**
F. Capolino, R. Tiberio, *University of Siena, Italy*
- 10:40 53.9 **A Discrete-Time Uniform Geometrical Theory of Diffraction for the Fast Transient Analysis of Scattering from Knife Wedges**
H.-T. Chou¹, H.-K. Ho², C.-Y. Chung¹, S.-K. Jeng¹
¹*Yuan Ze University, Taiwan*; ²*National Taiwan University, Taiwan*
- 11:00 53.10 **A Multi-aspect Z-Buffer Algorithm for Ray Tracing in High-Frequency Electromagnetic Scattering Computations**
Y. Zhou, H. Ling, *The University of Texas at Austin, USA*
- 11:20 53.11 **Computing the Radiation Pattern of an Antenna Mounted on a Complex Structure by Using Accelerated Physical Optics Method**
S. Karaca, *Turkish Naval Academy, Turkey*; D. Bolukbas, A. A. Ergin, *Gebze Institute of Technology, Turkey*
- 11:40 53.12 **Software ANDER: Analysis and Design of Reflector Antennas**
J. A. Martinez-Lorenzo, A. Garcia-Pino, M. Arias, O. Rubiños, *University of Vigo, Spain*

Session 54. Multi-Band/Wideband Dielectric Resonator Antennas

Tuesday, June 22 7:55-12:00

AP

DeAnza III

Co-Chairs: Atef Elsherbeni, *University of Mississippi, USA*
Yahia Antar, *Royal Military College of Canada, Canada*

- 7:55 Opening Remarks
- 8:00 54.1 **Feed Configurations of CPW Fed DRA**
B. Ghosh, Y. M. M. Antar, *Royal Military College of Canada, Canada*; A. Petosa, A. Ittipiboon, *Communications Research Centre Canada, Canada*
- 8:20 54.2 **Dual-band Dielectric Resonant Antenna**
T.-S. Yung, T.-H. Chang, W.-Z. Wu, J.-F. Kiang, *National Taiwan University, Taiwan*
- 8:40 54.3 **Elliptical Dielectric Resonator Antenna for Dual-Band Applications**
J.-J. Chen, Y.-C. Lin, R.-B. Wu, *National Taiwan University, Taiwan*
- 9:00 54.4 **A Novel Approach to Enhance the Bandwidth of Miniaturized Dielectric Resonator Antennas**
A. M. Buerkle, K. Sarabandi, H. Mosallaei, *University of Michigan, USA*
- 9:20 54.5 **Wideband Rectangular Dielectric Resonator Antenna For W-LAN Applications**
S. Mridula, B. Paul, S. K. Menon, C. K. Aanandan, K. Vasudevan, P. Mohanan, *Cochin University of Science and Technology, India*; P. V. Bijumon, M. T. Sebastian, *Regional Research Laboratory, India*

- 9:40 54.6 **Stepped Dielectric Resonator Antenna for Wideband Applications**
K. Pliakostathis, D. Mirshekar-Syahkal, *University of Essex, UK*
- 10:00 54.7 **Stacked Elliptical Dielectric Resonator Antennas for Wideband Applications**
M. H. Al Sharkawy, A. Z. Elsherbeni, C. E. Smith, *The University of Mississippi, USA*
- 10:20 54.8 **Broadband Aperture Coupled Flipped Staired Pyramid and Conical Dielectric Resonator Antennas**
R. Chair, A. A. Kishk, K. F. Lee, C. E. Smith, *University of Mississippi, USA*
- 10:40 54.9 **Multi-Eccentric Ring Slot-Fed Dielectric Resonator Antennas for Multi-Frequency Operations**
T. A. Denidni, Q. Rao, *University of Quebec, Canada*; A. R. Sebak, *Concordia University, Canada*
- 11:00 54.10 **Multimode Dielectric Resonator Antenna of Very High Permittivity**
G. Bit-Babik, C. Di Nallo, A. Faraone, *Motorola, USA*
- 11:20 54.11 **MM-Wave Wide-Scan Cylindrical Dielectric Lens Antennas**
X. Wu, J. Laurin, *Ecole Polytechnique de Montreal, Canada*
- 11:40 54.12 **Design of Dielectric Lens Antennas Producing Sharp Caustics**
Y. Tajima, Y. Yamada, A. Kezuka, *National Defense Academy, Japan*

Session 55. Metamaterials for Electromagnetic Applications

Tuesday, June 22 7:55-12:00

AP/URSI B: Joint Special Session

DeAnza II

Organizers: George V. Eleftheriades, *University of Toronto, Canada*
John L. Volakis, *The Ohio State University, USA*

Co-Chairs: George V. Eleftheriades, *University of Toronto, Canada*
John L. Volakis, *The Ohio State University, USA*

- 7:55 Opening Remarks
- 8:00 55.1 **Resonance Cone Phenomena in a Low-Profile Inhomogeneous Anisotropic Metamaterial Antenna**
K. G. Balmain, A. A. E. Luttgen, P. C. Kremer, *University of Toronto, Canada*
- 8:20 55.2 **RF Propagation in Finite Thickness Nonreciprocal Magnetic Photonic Crystals**
G. Mumcu, K. Sertel, J. L. Volakis, *The Ohio State University, USA*; I. Vitebskiy, A. Figotin, *University of California at Irvine, USA*
- 8:40 55.3 **Negative-Refractive-Index Transmission-Line Metamaterials and Enabling Electromagnetic Applications**
G. V. Eleftheriades, A. Grbic, M. Antoniades, *University of Toronto, Canada*
- 9:00 55.4 **Volumetric Artificial Magnetic Conductors for Antenna Applications**
A. Erentok, R. W. Ziolkowski, *The University of Arizona, USA*
- 9:20 55.5 **Negative Index Lens Phenomena**
D. R. Smith, D. Schurig, *University of California, San Diego, California*
- 9:40 55.6 **Space-Filling-Curve Elements as Possible Inclusions for Double-Negative Metamaterials**
J. McVay¹, N. Engheta², A. Hoofar¹
¹*Villanova University, USA*; ²*University of Pennsylvania, USA*
- 10:00 55.7 **Wave Interactions in a Left-Handed Mushroom Structure**
C. Caloz, A. Lai, T. Itoh, *University of California, Los Angeles, California*
- 10:20 55.8 **Tunable Metallic Photonic Crystals with an Effective Negative Index of Refraction**
M. S. Wheeler, J. S. Aitchison, C. D. Sarris, M. Mojahedi, *University of Toronto, Canada*
- 10:40 55.9 **Leaky-Wave Radiation from Planar Negative-Refractive-Index Transmission-Line Metamaterials**
A. K. Iyer, G. V. Eleftheriades, *University of Toronto, Canada*
- 11:00 55.10 **Embedded-Circuit Magnetic Metamaterial Substrate for Patch Antennas**
K. Buell, H. Mosallaei, K. Sarabandi, *University of Michigan, USA*
- 11:20 55.11 **Fundamental Constraints on Two-Dimensional EBG Substrates**
W. H. She¹, X. Gong², W. J. Chappell¹
¹*Purdue University, USA*; ²*University of Michigan, USA*
- 11:40 55.12 **Artificial Magnetic Conductors for Low-Profile Resonant Cavity Antennas**
S. Wang, A. P. Feresidis, G. Goussetis, J. C. Vardaxoglou, *Loughborough University, UK*

Session 56. Integration of Antennas in RF/Wireless Packages

Tuesday, June 22 7:55-12:00

AP/URSI B&D: Joint Special Session

DeAnza I

Organizers: Manos M. Tentzeris, *Georgia Institute of Technology, USA*
Jennifer Bernhard, *University of Illinois at Urbana-Champaign, USA*

Co-Chairs: Manos M. Tentzeris, *Georgia Institute of Technology, USA*
Jennifer Bernhard, *University of Illinois at Urbana-Champaign, USA*

- 7:55 Opening Remarks
- 8:00 56.1 **Constant-Frequency Voltage-Scanned Reflecto-Directive System**
S. Lim, C. Caloz, T. Itoh, *University of California, Los Angeles, USA*
- 8:20 56.2 **Integrable Miniaturized Folded Antennas for RFID Applications**
R. Li, G. DeJean, M. Tentzeris, J. Laskar, *Georgia Institute of Technology, USA*
- 8:40 56.3 **Packaging of Multibeam Spatially-Fed Antenna Arrays**
S. Rondineau, M. Bender Perotoni, N. Lopez, Z. Popovic, *University of Colorado at Boulder, USA*
- 9:00 56.4 **A Study of Diversity Performance of Integrated Combinations of Fixed and Reconfigurable Antennas on Portable Devices**
G. H. Huff, T. L. Roach, D. Chen, J. T. Bernhard, *University of Illinois at Urbana-Champaign, USA*
- 9:20 56.5 **A Novel Dual-Band WLAN Antenna for Notebook Platforms**
J. Yeo¹, Y. J. Lee², R. Mittra¹
¹*The Pennsylvania State University, USA*; ²*Pohang University of Science and Technology, Korea*
- 9:40 56.6 **Active Receiving Antennas for Automotive Applications**
Q. Xue, H. Wong, K.-M. Shum, K.-M. Luk, C. H. Chan, *City University of Hong Kong, China*
- 10:00 56.7 **Loss Reduction Methods for Planar Circuit Designs on Lossy Substrates**
I. K. Iotia, R. F. Drayton, *University of Minnesota, USA*
- 10:20 56.8 **Minimized Dual-Band Coupled Line Meander Antenna for System-In-a-Package Applications**
N. T. Pham, G.-A. Lee, F. De Flaviis, *University of California, Irvine, USA*
- 10:40 56.9 **Integration Issues of a Waveguide Photodetector with a CPW Fed Three Element Slot Antenna**
G. D. Tzermes¹, S. D. Mukherjee^{1,2}, P. K. L. Yu³, C. G. Christodoulou¹
¹*University of New Mexico, USA*; ²*Link, Sweden*; ³*University of California at San Diego, USA*
- 11:00 56.10 **Conformal Integration of Broadside to Endfire Radiation Reconfigurable Antennas onto Canonical Structures**
G. H. Huff, T. L. Roach, J. T. Bernhard, *University of Illinois at Urbana-Champaign, USA*
- 11:20 56.11 **Compact Double U-Slotted Microstrip Patch Antenna Element for GSM1800, UMTS and HiperLAN2**
C. J. O. Peixero, T. A. P. C. Gandara, *Instituto Superior Técnico, Portugal*
- 11:40 56.12 **Simulation of Millimeter Wavelength Ferroelectric Element Beamformer for Wireless Base Station Antenna**
N. C. Athanasopoulos, R. J. Makri, M. A. Gargalakos, N. K. Uzunoglu, *Institute of Communications and Computer Systems, Greece*

Session 57. Wavelets, FDTD, & TLM Methods

Tuesday, June 22 7:55-12:00

AP

Bonsai I

Co-Chairs: George Pan, *Arizona State University, USA*
Marc Kowalski, *Stanford Linear Accelerator Center*

- 7:55 Opening Remarks
- 8:00 57.1 **Numerical Modeling of Electromagnetics via a Wavelet-Collocation Method**
G. Bao, G. Wei, S. Zhao, *Michigan State University, USA*
- 8:20 57.2 **Wavelet-MoM Analysis of 3D Antennas with Triangular Mesh**
F. Vipiana, P. Pirinoli, G. Vecchi, *Polytechnic di Torino, Italy*
- 8:40 57.3 **A Priori Clipping Threshold Estimation for Wavelet-Based Method of Moments Matrices**
F. Andriulli, G. Vecchi, F. Vipiana, P. Pirinoli, *Polytechnic di Torino, Italy*
- 9:00 57.4 **Multiwavelets in Solving Integral Equations of the 1st and 2nd Kind**
M. Tong, G. W. Pan, *Arizona State University, USA*
- 9:20 57.5 **Multiresolution Analysis using Biorthogonal and Interpolating Wavelets**
P. R. T. Pinho, P. J. S. G. Ferreira, J. F. R. Pereira, *Universidade de Aveiro, Portugal*
- 9:40 57.6 **A 2D-TLM Model for Electromagnetic Wave Propagation in Chiral Media**
A. C. L. Cabeceira, I. Barba, A. Grande, J. Represa, *Universidad de Valladolid, Spain*
- 10:00 57.7 **Simulation of Frequency Dependent Photonic Crystals Using the Transmission Line Matrix Method**
G. Romo Luevano, T. Smy, *Carleton University, Canada*
- 10:20 57.8 **A New Iterative MoM/FDTD Analysis for EM Scattering by a Loop Antenna**
S. Mochizuki¹, S. Watanabe², M. Taki³, Y. Yamanaka², H. Shirai¹
¹Chuo University, Japan; ²Communications Research Laboratory, Japan; ³Tokyo Metropolitan University, Japan
- 10:40 57.9 **Optimally Accurate Second-Order Time-Domain Finite-Difference Scheme for Acoustic, Electromagnetic, and Elastodynamic Wave Modeling: One-Dimensional Case**
C. Bommaraju, R. Marklein, *University of Kassel, Germany*
- 11:00 57.10 **AMG Enhanced CN-FDTD Method for Low Frequency Electromagnetic Applications**
R. Qiang, J. Chen, *University of Houston, USA*
- 11:20 57.11 **A Generalized Mass Lumping Scheme for Maxwell's Wave Equation**
A. Fisher¹, D. White², G. Rodriguez¹
¹UC Davis, USA; ²Lawrence Livermore National Laboratory, USA
- 11:40 57.12 **Comparison of Different Numerical Modelling Techniques for Reverberation Chamber: Initial 2D Study**
U. Carlberg, P.-S. Kildal, J. Carlsson, K. Karlsson, *Chalmers University of Technology, Sweden*

Session 58. Electromagnetic Theory II

Tuesday, June 22 7:55-12:00

URSI B

Bonsai II

Co-Chairs: S.R. Seshadri, *Unaffiliated; Madison, WI, USA*
Ehud Heyman, *Tel Aviv University, Israel*

- 7:55 Opening Remarks
- 8:00 58.1 **Plane Waves near Directions of Singularities of the Wave Vector Surfaces**
S. R. Seshadri, *Unaffiliated, USA*
- 8:20 58.2 **Electromagnetic Gaussian Beam Beyond the Paraxial Approximation**
S. R. Seshadri, *Unaffiliated, USA*
- 8:40 58.3 **Simulation of Quantum Computer Search Algorithms at Microwave Frequencies**
R. D. Nevels, J. Jeong, *Texas A&M University, USA*
- 9:00 58.4 **Electromagnetic Properties of Aperiodic Tilings: Background and Preliminary New Results**
G. Castaldi¹, R. P. Croce¹, V. Fiumara², V. Galdi¹, V. Pierro¹, I. M. Pinto¹, L. B. Felsen³
¹University of Sannio, Italy; ²University of Salerno, Italy; ³Boston University, USA
- 9:20 58.5 **Discrete Helmholtz Decomposition, Euler's Formula, and the Degrees of Freedom of Lattice Electrodynamics**
B. He, F. L. Teixeira, *Ohio State University, USA*
- 9:40 58.6 **Obtaining Reactive Power Density from Complex Poynting Theorem**
D. M. Marciano¹, A. Sharaiha², K. Mahdjoubi², M. Diaz¹
¹Universidad Simon Bolivar, Venezuela; ²Universite de Rennes I, France

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| 10:00 | 58.7 | Windowed Radon Transform Frames and Their Application in Short-Pulse Radiation <i>E. Heyman, Tel Aviv University, Israel; A. Shlivinski, University of Kassel, Germany</i> |
| 10:20 | 58.8 | Dynamic Charge Density Model of the Infinite Thin-wire Dipole <i>C. C. Bantin, C.C.Bantin & Associates Ltd., Canada</i> |
| 10:40 | 58.9 | How Accelerated Charge Causes Radiation from Specified Filamentary Currents and a Perfectly Conducting Straight Wire <i>E. K. Miller, Los Alamos National Laboratory (retired), USA</i> |
| 11:00 | 58.10 | The Effective Point of Radiation for a Microstrip Patch Antenna <i>L. I. Basilio, Sandia National Laboratories, USA; J. T. Williams, D. R. Jackson, University of Houston, USA</i> |
| 11:20 | 58.11 | Focusing Properties of a Three-Parameter Class of Oblate, Luneburg-like Inhomogeneous Lenses <i>J. A. Grzesik, Northrop Grumman Space Technology, USA</i> |
| 11:40 | 58.12 | Mutual Impedance of Vertical Antennas above a Semi-Infinite Ground in Closed-Form <i>R. M. Shubair, Etisalat College of Engineering, UAE</i> |

Session 59. Propagation Measurements

Tuesday, June 22 7:55-10:00

URSI F

Bonsai III

Co-Chairs: Amalia Barrios, SPAWAR SYSCEN, USA
Kamal Sarabandi, University of Michigan, USA

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| 7:55 | Opening Remarks | |
| 8:00 | The Effect of Common Test Environments on LF Magnetic Field Measurements <i>J. D. Brunett, V. V. Liepa, University of Michigan, USA</i> | |
| 8:20 | Near-Earth Wave Propagation Simulation for an Irregular Terrain <i>I.-S. Koh, K. Sarabandi, The University of Michigan, USA</i> | |
| 8:40 | Measurement of Ultra-Wide-Band Propagation Through Wall Structures <i>J. Li, H. D. Foltz, University of Texas-Pan American, USA; J. McLean, TDK Corp., USA</i> | |
| 9:00 | Validation of the Advanced Propagation Model (APM) for VHF Signals on Low Altitude Mobile Receiver Paths <i>A. E. Barrios, K. Anderson, Spawar Systems Center San Diego, USA</i> | |
| 9:20 | Characterisation of On-Body Communication Channels <i>P. S. Hall¹, Y. Nechayev¹, A. Owadally², Y. Hao², C. Constantinou¹, C. Parini² ¹The University of Birmingham, UK; ²Queen Mary University of London, UK</i> | |
| 9:40 | Ground Wave Propagation Measurement in the HF to VHF Frequency Ranges over Non-Line-of-Sight Terrains <i>R. L. Rogers, W. Vogel, S. Lacker, S. Lim, H. Ling, The University of Texas, USA</i> | |

Session 60. Reflectors, Lenses, and Frequency Selective Surfaces

Tuesday, June 22 7:55-12:00

URSI B

Ironwood

Co-Chairs: Sembiam Rengarajan, California State University Northridge, USA
Mario Orefice, Politecnico di Torino, Italy

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| 7:55 | Opening Remarks | |
| 8:00 | A Printed Reflectarray with Annular Patches <i>M. Orefice, P. Pirinoli, C. Zuin, Politecnico di Torino, Italy</i> | |
| 8:20 | Microstrip Reflectarrays Consisting of Multi-layer Stacked Patches <i>S. R. Rengarajan, California State University, USA</i> | |

- 8:40 60.3 **Scanning Properties of Large Reflectarray Antennas**
R. E. Hodges, M. S. Zawadzki, *Jet Propulsion Laboratory, USA*
- 9:00 60.4 **Surface Reflection of Waveguide Lens Antennas**
T.-K. Wu, *NGST, USA*
- 9:20 60.5 **Design and Analysis of a Tri-Band Center-Fed SATCOM Reflector Antenna**
G. Gothard, J. Kralovec, *Harris Corp, USA*
- 9:40 60.6 **Terrestrial Based Deployable Dish Antennas**
L. T. Lowe, *Phase IV Systems, USA*; P. A. Gierow, R. D. Hackett, *SRS Technologies, Inc., USA*; A. Danis, *Office of Secretary of Defense, USA*
- 10:00 60.7 **A Variably Reflective Surface Using FSS with Application to Reflector Antennas**
J. Kralovec, T. Durham, V. Hibner, *Harris Corp., USA*
- 10:20 60.8 **Capacitive Ka-Band Frequency Selective Surface for Deep Space Antennas**
P. Besso, *European Space Agency - ESOC, Germany*; M. Bozzi, L. Perregini, *University of Pavia, Italy*; L. Salghetti Drioli, *European Space Agency - ESTEC, The Netherlands*
- 10:40 60.9 **Modeling Finite and Curved Frequency Selective Surfaces with Approximate Impedance Boundary Conditions**
B. Stupfel, Y. Pion, *CEA/CESTA, France*
- 11:00 60.10 **The Synthesis of Planar Left-Handed Metamaterials from Frequency Selective Surfaces Using Genetic Algorithms**
M. A. Gingrich, D. H. Werner, *The Pennsylvania State University, USA*; A. Monorchio, *The University of Pisa, Italy*
- 11:20 60.11 **Nano-Scale Frequency Selective Surfaces for Thermophotovoltaic Energy Conversion**
R. L. Chen, J. Chen, K. Han, A. Ruiz, *University of Houston, USA*; M. Morgan, *EDTEK, Inc., USA*
- 11:40 60.12 **A Near Infrared Optical Thermo-photovoltaic Filter Design Using Frequency Selective Volumes**
E. Topsakal, Z. Hood, *Mississippi State University, USA*

Session 61. Waveguides, Radiators, and Horns

Tuesday, June 22 7:55-12:00

AP

Cottonwood

Co-Chairs: Allen Glisson, *University of Mississippi, USA*
Donald Dudley, *University of Arizona, USA*

- 7:55 Opening Remarks
- 8:00 61.1 **Modeling of a Waveguide Probe Excitation for Dielectric Resonator Antennas**
I. A. Eshrah, A. A. Kishk, A. B. Yakovlev, A. W. Glisson, *University of Mississippi, USA*
- 8:20 61.2 **A Novel Antenna Concept with Interleaved Tx- and Rx-Apertures**
B. I. Svensson, *Ericsson AB, Sweden*; K. Falk, B. Wästberg, *Ericsson Microwave Systems AB, Sweden*
- 8:40 61.3 **A Study of a Microwave Electromagnetic Bandgap Structure with Waveguiding Defect for Potential Use as a Bandpass Wireless Interconnect**
J. J. Simpson, A. Taflove, *Northwestern University, USA*; J. A. Mix, H. Heck, *Intel Corporation, USA*
- 9:00 61.4 **A Stepped Post-Wall Waveguide with Aperture Interface to Standard Waveguide**
T. Kai, J. Hirokawa, M. Ando, *Tokyo Institute of Technology, Japan*
- 9:20 61.5 **X-Band TM01-TE11 Mode Converter**
W. S. Lee, K. S. Park, B. M. Lee, Y. J. Yoon, *Yonsei University, Korea*; J.-H. So, *Agency for Defense Development, Korea*; W. Y. Song, *Cheongju University, Korea*
- 9:40 61.6 **Novel Partly Shielded Finite Ground Coplanar Waveguide**
J. Wang, B.-Z. Wang, W. Shao, *University of Electronic Science and Technology of China, China*
- 10:00 61.7 **Design of Hard Horn Antenna Using Both Single Dominant Quasi-TEM Mode Model and Mode-Matching**
O. Sotoudeh, P.-S. Kildal, *Chalmers University of Technology, Sweden*; P. Ingvarson, *SAAB Ericsson Space, Sweden*
- 10:20 61.8 **Roles of Matching Layers for a Shaped Beam Lens Horn Antenna**
A. Kezuka, Y. Yamada, *National Defense Academy, Japan*
- 10:40 61.9 **Optimization of the Electromagnetic Fields at the Aperture of a Wave Guide Horn by Using a “Floating”**

Dielectric Insert, in Foam Technology

F. Averty¹, A. Louzir², J.-F. Pintos², P. Chambelin¹, C. Person¹, J.-P. Coupez¹, G. Landrac¹
¹*ENST de Bretagne, France;* ²*Thomson, France*

- 11:00 61.10 **Rigorous Hybrid MM/FE/MOM Analysis of Longitudinally Corrugated Horns**
F. Arndt, V. Catina, *University of Bremen, Germany*; J. Brandt, *MiG, Germany*

- 11:20 61.11 **A Truncated Waveguide Antenna Fed by a Longitudinal Slot**
G. Montisci, G. Mazzarella, M. Serra, *Università di Cagliari, Italy*

- 11:40 61.12 **Feed Horn Antenna Including Circular-Polarizer and Straight Type Mode Converter to Illuminate Shaped Reflector at Ka-Band**
J. S. Yun, S. Jeon, J. Chae, *Electronics Telecommunication Research Institute, Korea*

Session 62. Nonlinear Electromagnetics for Devices and Waves

Tuesday, June 22 10:00-12:00

AP/URSI B&D

Ferrante III

Co-Chairs: Mauricio Silveira, *National Institute of Telecom - INATEL, Brazil*
Vikram Jandhyala, *University of Washington, USA*

- 10:00 62.1 **An Integrated Micromachined Waveguide Frequency Tripler for Nonlinear Wave Propagation**
W. H. Chow, P. Steenson, *Institute of Microwaves and Photonics, UK*; T. T. Piotrowski, A. Piotrowska, K. Golaszewska, *Institute of Electron Technology, Poland*
- 10:20 62.2 **Adaptive Linearization Digital Signals: I and Q**
M. P. S. Silva¹, A. A. Mello², F. G. Pina², L. S. Ribeiro¹, J. S. Lima², M. Silveira¹
¹*National Institute of Telecommunication - INATEL, Brazil*; ²*Linear Electronic Equipment Company, Brazil*
- 10:40 62.3 **Some Insight on the Behaviour of Heuristic PIM Scattering Models for TD-PO Analysis**
S. Selleri¹, P. Bolli², G. Pelosi¹
¹*University of Florence, Italy*; ²*Italian National Research Council, Italy*
- 11:00 62.4 **Implementation of an AM-VSB Modulator Using the Hilbert Transform**
M. Silveira¹, J. D. S. Lima², H. D. Rodrigues², B. A. Pereira¹
¹*National Institute of Telecommunication - INATEL, Brazil*; ²*Linear Equipamentos Eletrônicos S.A., Brazil*
- 11:20 62.5 **A New Numerical Approach to Estimate the Intermodulation Levels in the Transponders for Links via Satellite Communications**
M. Silveira, C. N. M. Marins, *National Institute of Telecommunication - INATEL, Brazil*
- 11:40 62.6 **A Broad-Band Millimeter-Wave IMPATT Oscillator Using Coaxial-Waveguide Cavity**
S. Kar, *University of Calcutta, India*

Session 63. Stacked Patch Antennas

Tuesday, June 22 10:00-12:00

AP

Ferrante I

Co-Chairs: M.C. Bailey, *Research Triangle Institute, USA*
W.S.T. Rowe, *RMIT University, Australia*

- 10:00 63.1 **Integrated Stacked Patch Antenna Array on LTCC Material Operating at 24 GHz**
S. Holzwarth, R. Kulke, J. Kassner, *IMST GmbH, Germany*
- 10:20 63.2 **A High Gain Antenna for Small Satellite Missions**
L. Boccia, E. Arnieri, G. Amendola, G. Di Massa, *University of Calabria, Italy*
- 10:40 63.3 **Investigation of Proximity Coupled Antennas Suitable for MMIC Integration**
W. S. Rowe, *RMIT University, Australia*; R. B. Waterhouse, *Pharad, USA*
- 11:00 63.4 **High Gain Radiating Structure Using Multi-Layered Metallic Disks**
S. Y. Eom, S. I. Jeon, *Electronics and Telecommunications Research Institute (ETRI), Korea*; A. V. Shishlov, *Radiophyzika, Russian Federation*

- 11:20 63.5 **A Stacked Patch Antenna Design with Strict Bandpass Filter Characteristics**
M. C. Bailey, *RTI International, USA*
- 11:40 63.6 **A Dual-Polarized Stacked Microstrip Antenna Subarray for X-Band SAR Application**
W. Wang, S.-S. Zhong, X. L. Liang, *Shanghai University, China*

Session 64. Propagation in Complex Environments

Tuesday, June 22 10:00-12:00

AP

Bonsai III

Co-Chairs: Joseph W. Schuster, *Remcom Inc., USA*
Charles W. Bostian, *Virginia Polytechnic Institute and State University, USA*

- 10:00 64.1 **Application of Moving Window FDTD to Predicting Path Loss over Forest Covered Irregular Terrain**
J. W. Schuster, K. C. Wu, R. J. Luebbers, R. R. Ohs, *Remcom, USA*
- 10:20 64.2 **Power Transmission Gain Measurements of Integrated Antenna Pairs in Indoor and Outdoor Environments**
J.-J. Lin, X. Guo, R. Li, J. J. Brewer, K. K. O, *University of Florida, USA*
- 10:40 64.3 **Transmission Characteristics of 28 GHZ NLOS Paths**
M. T. Miniuk, T. M. Gallagher, C. W. Bostian, *Virginia Tech, USA*
- 11:00 64.4 **Database Simplification for Field Prediction in Urban Environment**
V. Degli-Esposti, F. Fuschini, M. Amorini, *University of Bologna, Italy*
- 11:20 64.5 **Investigation of Using Passive Repeaters for Indoor Radio Coverage Improvement**
Y. Huang, N. Yi, X. Zhu, *Univ of Liverpool, UK*
- 11:40 64.6 **Mining Environment Multi-Media Services Characterization Using Propagation Measurements**
M. Ndoh, *Laval University, Canada*; G. Y. Delisle, *University of Ottawa (SITE), Canada*

Session 65. Propagation in Urban Indoor/Outdoor Environments I

Tuesday, June 22 13:25-17:30

AP: Special Session

San Carlos I

Organizers: Dennis Andersh, *SAIC - Demaco, USA*
Hiroshi Shirai, *Chuo University, Japan*

Co-Chairs: Dennis Andersh, *SAIC - Demaco, USA*
Hiroshi Shirai, *Chuo University, Japan*

- 13:25 Opening Remarks
- 13:30 65.1 **Wave Propagation Characterization in Complex Urban Areas using EMTerrano**
F. Aryanfar, K. Sarabandi, *The University of Michigan, USA*; M. D. Casciato, K. Sabet, *EMAG Technologies, USA*
- 13:50 65.2 **3-D Wave Propagation Simulation in Complex Indoor Structures**
F. Aryanfar, K. Sarabandi, *University of Michigan, USA*
- 14:10 65.3 **Shooting-and-Bouncing Ray Method for 3D Indoor Wireless Propagation in WLAN Applications**
R. A. Kipp, *SAIC, USA*
- 14:30 65.4 **Propagation Studies Using Rigorous Methods for Indoor Wireless Connectivity**
C.-P. E. Lim, R. W. Kindt, K. Sertel, J. L. Volakis, *The Ohio State University, USA*; A. Anastopoulos, *The University of Michigan, USA*
- 14:50 65.5 **Propagation Modeling of Wireless Networks for Interceptability Assessment**
D. C. Jenn, *Naval Postgraduate School, USA*; W. P. Lim, *Singapore Ministry of Defense, Singapore*; P. Sumagaysay, *United States Navy, USA*
- 15:10 65.6 **Radio Wave Propagation Analysis for a Simple Indoor Model**
R. Sato, *Niigata University, Japan*; H. Shirai, *Chuo University, Japan*

- 15:30 65.7 **Measured Results of Quasi-Zenith Satellite Visibility and Its Time Delayed Diversity (TDD) System Characteristics**
T. Hatsuda, K. Hashimoto, J. Masuda, J. Murakami, *Hokkaido Inst. of Tech., Japan*
- 15:50 65.8 **Site-Diversity and Time-Diversity Fade Duration Statistics for Fade Countermeasures of DTH/VSAT Ku-Band Satellite Services**
Q. Pan¹, J. E. Allnutt², C. Tsui¹
¹*Manukau Institute of Technology, New Zealand;* ²*George Mason University, USA*
- 16:10 65.9 **First Year Results on Rain Attenuation Characteristics of Satellite links at Equatorial Atmospheric Radar**
Y. Maekawa, T. Fujiwara, Y. Shibagaki, *Osaka Electro-Communication University, Japan*; T. Sato, M. Yamamoto, H. Hashiguchi, S. Fukao, *Kyoto University, Japan*
- 16:30 65.10 **Methods For Reducing The Computing Time In Indoor 3D Ray Shooting Simulations**
A. Mehdi, H. Cyril, S. Michel, *ESYCOM, France*
- 16:50 65.11 **Studying the Communications Potential of the Enclosed-Space Radio Channel**
J. P. Van't Hof, D. D. Stancil, *Carnegie Mellon University, USA*
- 17:10 65.12 **An Equivalent Circuit of a Bidirectional Antenna using a Probe Excited Rectangular Ring**
S. Lamultree, C. Phongcharoenpanich, S. Kosulvit, M. Krairiksh, *King Mongkuts Institute of Technology Ladkrabang, Thailand*

Session 66. Enhancing & Hybridizing the FDTD

Tuesday, June 22 13:25-17:30

AP/URSI B: Joint Special Session

San Carlos II

Organizers: Massimiliano Marrone, *Pennsylvania State University, USA*
Raj Mittra, *Pennsylvania State University, USA*

Co-Chairs: Massimiliano Marrone, *Pennsylvania State University, USA*
Raj Mittra, *Pennsylvania State University, USA*

- 13:25 Opening Remarks
- 13:30 66.1 **Stability, Accuracy and Application of an FDTD-TDFEM Algorithm**
T. Rylander, A. Bondeson, Y. Q. Liu, *Chalmers University of Technology, Sweden*
- 13:50 66.2 **A Comparison of Different Enhanced FDTD Schemes on Generalized Grids**
F. Edelvik, M. Cinalli, R. Schuhmann, T. Weiland, *Technische Universität Darmstadt, Germany*
- 14:10 66.3 **A New Stable Hybrid Three-Dimensional Finite Difference Time Domain (FDTD) Algorithm for Analyzing Complex Structures**
M. Marrone, R. Mittra, *Pennsylvania State University, USA*
- 14:30 66.4 **Unconditionally Stable, Nonstaggered FDTD Scheme for Hybrid FDTD/FETD**
S. Wang, *General Electric Medical Systems, USA*; F. L. Teixeira, *The Ohio State University, USA*
- 14:50 66.5 **Non-Standard Finite Difference in Electromagnetics**
B. Yang, C. A. Balanis, *Arizona State University, USA*
- 15:10 66.6 **The Accuracy of ADI-FDTD: Recent Insights about Truncation Errors and Source Conditions**
S. Gonzalez Garcia, A. Rubio Bretones, *University of Granada, Spain*; S. C. Hagness, *University of Wisconsin-Madison, USA*
- 15:30 66.7 **3D Hybrid ADI-FDTD/FDTD Subgridding Scheme Applied to RF/Microwave and Optical Structures**
Z. Chen, I. Ahmed, *Dalhousie University, Canada*
- 15:50 66.8 **A Hybrid Method Combining ADI-FDTD and MoMTD: Applications**
A. R. Bretones, S. G. Garcia, R. G. Rubio, R. G. Martin, *University of Granada, Spain*
- 16:10 66.9 **Enhancing the FDTD with Asymptotic Methods**
R. Mittra, T. Zhao, L.-C. Ma, *Pennsylvania State University, USA*
- 16:30 66.10 **Full wave Analysis of Horn antennas in the presence of a Radome by using the Conformal Finite Difference Time Domain (CFDTD) Algorithm**
A. Monorchio, *University of Pisa, Italy*
- 16:50 66.11 **A Software-Coupled 2D FDTD Hardware Accelerator**
R. N. Schneider, M. M. Okoniewski, L. E. Turner, *University of Calgary, Canada*

- 17:10 66.12 **Nolinear FDTD Solution to the High-Field Conduction Model for Some Solid Dielectrics**
X. Dong, W.-Y. Yin, Y. B. Gan, *National University of Singapore, Singapore*

Session 67. Antennas and Propagation in MIMO Systems II

Tuesday, June 22 13:25-17:30

AP: Special Session

San Carlos III

Organizers: Werner Wiesbeck, *University of Karlsruhe, Germany*
Michael Jensen, *Brigham Young University, USA*

Co-Chairs: Werner Wiesbeck, *University of Karlsruhe, Germany*
Michael Jensen, *Brigham Young University, USA*

- 13:25 Opening Remarks
- 13:30 67.1 **Impact of Antenna Geometry on MIMO Communication in Indoor Clustered Channels**
A. Forenza, R. W. Heath, *The University of Texas at Austin, USA*
- 13:50 67.2 **Investigation of the Influence of Antenna Array Parameters on Adaptive MIMO Performance**
A. Grau, S. Liu, B. A. Cetiner, F. De Flaviis, *University of California, Irvine, USA*
- 14:10 67.3 **DoA Resolution Limits in MIMO Channel Sounding**
M. H. Landmann, A. Richter, R. Thoma, *Ilmenau University of Technology, Germany*
- 14:30 67.4 **Multipath Characterization of Antennas for MIMO Systems in Reverberation Chamber Including Effects of Coupling and Efficiency**
K. Rosengren, *Flextronics Design, Sweden*; P. Bohlin, P.-S. Kildal, *Chalmers University of Technology, Sweden*
- 14:50 67.5 **A Real-Time Multiple Antenna Element Testbed for MIMO Algorithm Development and Assessment**
J. W. Wallace, B. D. Jeffs, M. A. Jensen, *Brigham Young University, USA*
- 15:10 67.6 **Capacity of a 2×2 MIMO Antenna System with Mutual Coupling Losses**
B. Lindmark, *KTH, Sweden*
- 15:30 67.7 **Improving MIMO System Capacity by Compensating Mutual Coupling in Transmitting/Receiving Array Antennas**
P. Uthansakul, M. Uthansakul, M. E. Bialkowski, *University of Queensland, Australia*
- 15:50 67.8 **Representation of the Envelope Correlation as a Function of Distance and Frequency for a Two-Port Antenna System**
S. P. I. Dossche, J. Romeu, S. Blanch, *Universitat Politècnica de Catalunya, Spain*
- 16:10 67.9 **Space-Time EVA Blind Equalization for High Data Rate Wireless Communications**
S. E. El-Khamy, *Alexandria University, Egypt*; A. K. Sadek, *University of Maryland, USA*
- 16:30 67.10 **Distance-Selective Wireless Networks with Enhanced Isolation Characteristics: A New Concept Based on Three-Dimensional Wave Field Synthesis for Volumetric-Controlled Field Coverage**
M. A. Terada, *New Mexico State University, USA*
- 16:50 67.11 **Study of Dual-Polarized Omni-Directional Antennas for 5.2 GHz-Band 2X2 MIMO-OFDM Systems**
A. Ando, N. Kita, W. Yamada, K. Itokawa, A. Sato, *Nippon Telegraph and Telephone, Japan*
- 17:10 67.12 **Environment-Oriented Beamforming for Space-Time Block Coded Multiuser MIMO Communications**
N. C. Karmakar, C. Sun, *Nanyang Technological University, Singapore*

Session 68. Characterization & Performance Improvement Techniques for UWB Antennas

Tuesday, June 22 13:25-17:30

AP

San Carlos IV

Co-Chairs: Donald McLemore, *Advanced Engineering and Sciences, a division of ITT Industries, USA*
Norma Riley, *Northrup Grumman Mission Systems, USA*

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| 13:25 | Opening Remarks |
| 13:30 68.1 | Pole/Residue Modeling of UWB Antenna Systems <u>S. Licul</u> , W. A. Davis, <i>Virginia Polytechnic Institute and State University, USA</i> |
| 13:50 68.2 | Efficient Characterization of UWB Antennas Using the FDTD Method <u>D. Manteufel</u> , J. Kunisch, <i>IMST, Germany</i> |
| 14:10 68.3 | Design and Optimization of UWB Antennas by a Powerful CAD Tool: PULSE KIT <u>X. H. Wu</u> , <i>National University of Singapore, Singapore</i> ; Z. N. Chen, <i>Institute for Infocomm Research, Singapore</i> |
| 14:30 68.4 | Analysis of Antennas for Ultra-Wideband Pulse Radiation <u>J. D. Morrow</u> , <i>Cushcraft Corporation, USA</i> ; J. T. Williams, <i>University of Houston, USA</i> |
| 14:50 68.5 | Improving the Aperture Efficiency in Impulse Radiating Antennas Using Polarization Control <u>J. S. Tyo</u> , C. J. Buchenauer, J. Boddeker, <i>University of New Mexico, USA</i> |
| 15:10 68.6 | A Parametric Study of Band-Notched UWB Planar Monopole Antennas <u>A. Kerkhoff</u> , H. Ling, <i>University of Texas - Austin, USA</i> |
| 15:30 68.7 | Economical Resistive Tapering of Bowtie Antennas <u>T. Amert</u> ¹ , J. Wolf ¹ , L. Albers ¹ , D. Palecek ¹ , S. Thompson ² , B. Askildsen ² , K. W. Whites ¹ ¹ <i>South Dakota School of Mines and Technology, USA</i> ; ² <i>RealTronics, Inc., USA</i> |
| 15:50 68.8 | Application of Double-Negative Materials to Improve an Ultra-Wideband TEM Horn <u>M. H. Vogel</u> , <i>Ansoft Corporation, USA</i> |
| 16:10 68.9 | Ultra Wideband Tapered Slot Antenna with Band-stop Characteristic <u>I.-J. Yoon</u> , <i>Yonsei University, Korea</i> ; H. Kim, K. Chang, Y. J. Yoon, <i>Yonsei University, Korea</i> ; Y.-H. Kim, <i>Samsung Advanced Institute of Technology, Korea</i> |
| 16:30 68.10 | A Study on the UWB Antenna with Band-Rejection Characteristic <u>H. K. Yoon</u> , H. Kim, K. Chang, Y. J. Yoon, <i>Yonsei University, Korea</i> ; Y.-H. Kim, <i>Samsung Advanced Institute of Technology, Korea</i> |
| 16:50 68.11 | Planar Ultra Wide Band Slot Antenna with Frequency Band Notch Function <u>Y. Kim</u> , D.-H. Kwon, <i>Samsung Advanced Institute of Technology, Korea</i> |
| 17:10 68.12 | Effect of Slot Width Variation on Performance of Wideband, Probe-Fed U-Slot Patch Antennas <u>E. A. Chettiar</u> , V. Natarajan, D. Chatterjee, <i>University of Missouri Kansas City (UMKC), USA</i> |

Session 69. Reconfigurable Antenna Elements and Arrays

Tuesday, June 22 13:25-17:30

AP

Ferrante III

Co-Chairs: James Schaffner, *HRL Laboratories LLC, USA*
Daniel Sievenpiper, *HRL Laboratories LLC, USA*

| | |
|------------|---|
| 13:25 | Opening Remarks |
| 13:30 69.1 | A Novel Reconfigurable Patch Antenna with Both Frequency and Polarization Diversities for Wireless Communications <u>N. Jin</u> , F. Yang, Y. Rahmat-Samii, <i>University of California, Los Angeles, USA</i> |
| 13:50 69.2 | Reconfigurable Reflectarray with Variable Height Patch Elements: Design and Fabrication <u>J. P. Gianvittorio</u> , Y. Rahmat-Samii, <i>University of California, Los Angeles, California</i> |
| 14:10 69.3 | Silicon-Etched Re-Configurable Self-Similar Antenna with RF-MEMS Switches <u>D. E. Anagnostou</u> ¹ , G. Zheng ² , L. Feldner ¹ , M. T. Chryssomallis ³ , J. Lyke ⁴ , J. Papapolymerou ² , C. G. Christodoulou ¹ ¹ <i>University of New Mexico, USA</i> ; ² <i>Georgia Institute of Technology, USA</i> ; ³ <i>Demokritos University of Thrace, Greece, Greece</i> ; ⁴ <i>Airforce Research Laboratory, Kirtland AFB, USA</i> |
| 14:30 69.4 | Analysis of Reconfigurable Printed Antenna Using Characteristic Modes: FDTD Approach <u>N. Surittikul</u> , R. G. Rojas, <i>The Ohio State University, USA</i> |
| 14:50 69.5 | Design of Triple-Band Reconfigurable Microstrip Antenna Employing RF-MEMS Switches <u>S. Onat</u> , <u>L. Alatan</u> , S. Demir, <i>Middle East Technical University, Turkey</i> |
| 15:10 69.6 | Yagi V-Dipole Reconfigurable Antenna <u>W. Chen</u> , L. Yang, F. Chen, Z. Feng, <i>Tsinghua Univ., China</i> |

- 15:30 69.7 **Bent Monopole Antennas on EBG Ground Plane with Reconfigurable Radiation Patterns**
F. Yang, Y. Rahmat-Samii, *UCLA, USA*
- 15:50 69.8 **Low-Cost Circular-Polarized Millimeter-Wave Scanning Antenna**
C. T. Rodenbeck, M.-Y. Li, K. Chang, *Texas A&M University, USA*
- 16:10 69.9 **An Electronically Tunable Reflectarray Using Varactor Diode-Tuned Elements**
S. V. Hum, *TRLabs / University of Calgary, Canada*; M. Okoniewski, *University of Calgary, Canada*
- 16:30 69.10 **Microstrip Periodic Leaky-Wave Antenna with Optical Control and Beam Scanning Capabilities**
M. Zuliani¹, A. Petosa¹, A. Ittipiboon¹, L. Roy², R. Chaharmir¹
¹*Communications Research Centre Canada, Canada*; ²*Carleton University, Canada*
- 16:50 69.11 **CPW-Fed Slot Microstrip Mems-Based Reconfigurable Arrays**
L. L. Le Garrec, M. M. Himdi, R. R. Sauleau, *IETR (Institut d'Electronique et de Telecommunication de Rennes), France*; L. L. Mazenq, K. K. Grenier, R. R. Plana, *LAAS, France*
- 17:10 69.12 **A Novel Frequency Agile Beam Scanning Reconfigurable Antenna**
C. S. DeLucia, D. H. Werner, P. L. Werner, *The Pennsylvania State University, USA*; M. Fernandez Pantoja, A. Rubio Bretones, *University of Granada, Facultad de Ciencias, Spain*

Session 70. Novel Radiating Elements and Antennas

Tuesday, June 22 13:25-17:30

URSI B

Ferrante II

Co-Chairs: Michael Hamid, *University of South Alabama, USA*
M.F. Iskander, *University of Hawaii, USA*

- 13:25 Opening Remarks
- 13:30 70.1 **The Dielectric Supported Electrically Small Circular Patch Antenna**
T. L. Simpson, Y. Chen, *University of South Carolina, USA*; J. Chavez, *SPAWAR, USA*
- 13:50 70.2 **Compact Dual-polarized 4-Port Microstrip Antenna with Decoupling-Network**
Y.-H. Lu¹, H. J. Chaloupka², J. C. Coetzee¹
¹*National University of Singapore, Singapore*; ²*University of Wuppertal, Germany*
- 14:10 70.3 **Structural Integrated Airborne Antenna Array**
W. von Storp, R. Sekora, M. Boeck, *EADS Deutschland GmbH, Germany*
- 14:30 70.4 **Broadband Dual-Mode Performance of a Two-Arm Slot Spiral**
D. S. Filipovic, M. Lukic, Q. Mathews, *University of Colorado, USA*; T. Cencich, *Lockheed Martin, USA*
- 14:50 70.5 **Low-Profile, Wide-Band, Archimedean Spiral Antenna**
J. M. Bell, M. F. Iskander, *University of Hawaii at Manoa, USA*
- 15:10 70.6 **Self-Complementarity and Miniaturization in Antenna Design**
R. Azadegan, K. Sarabandi, *The University of Michigan, USA*
- 15:30 70.7 **A Leaky Slot Printed Between Two Infinite Dielectrics: a Non Dispersive Design with Constant Input Impedance**
S. Bruni, A. Neto, G. Gerini, *TNO Physics and Electronics Laboratory, The Netherlands*; F. Marliani, *ESA, The Netherlands*
- 15:50 70.8 **Unconventional Traveling Wave Antenna for Telemetry Purposes**
M. Hamid, *University of South Alabama, USA*; N. Gholson, L. P. Curvin, *Science Applications International Corporation, USA*
- 16:10 70.9 **Spheroidal Dielectric Resonator Antenna**
A. Tadjalli, A. R. Sebak, *Concordia University, Canada*; T. A. Denidni, *INRS-EMT, Canada*; A. Kishk, *University of Mississippi, USA*
- 16:30 70.10 **The Butterfly-loop Antenna - A New Structure with Better Performance**
K. Sivanand, *Institute for Infocomm Research, Singapore*; L. W. Li, M. S. Leong, P. S. Kooi, *National University of Singapore, Singapore*
- 16:50 70.11 **Design of Broadband Impedance Matching Anisotropic Quarter-Wave Polarizers**
H.-L. Su, K.-H. Lin, *Nation Sun Yat-Sen University, Taiwan*

- 17:10 70.12 **Design of Dual-Band Dual-Polarized Antenna with Frequency Selective Surface Cover and Artificial Impedance Surface**
H. Chae, Y. Kim, H. Kim, S. Nam, *Seoul National University, Korea*

Session 71. Dosimetry and Medical Applications

Tuesday, June 22 13:25-17:30

AP/URSI K

Ferrante I

Co-Chairs: Om P. Gandhi, *University of Utah, USA*
Koichi Ito, *Chiba University, Japan*

- 13:25 Opening Remarks
- 13:30 71.1 **An Open-Ended Waveguide System for SAR Measurement System Validation and Effect of Dielectric Properties on the Peak 1- and 10-G SAR for 802.11a Frequencies 5.15 to 5.85 GHz**
G. Kang, Q. Li, O. P. Gandhi, *University of Utah, USA*
- 13:50 71.2 **High-Speed SAR Prediction for Mass Production Stages in a Factory by H-Field Measurements**
K. Ogawa, A. Ozaki, S. Kajiwara, A. Yamamoto, *Matsushita Electric Industrial Co., Ltd., Japan*; Y. Koyanagi, *Panasonic Mobile Communications Co., Ltd., Japan*; Y. Saito, *Panasonic Mobile Communications Kanazawa R&D Lab. Co., Ltd., Japan*
- 14:10 71.3 **FDTD Computation of SAR Reduction in the Human Head for Mobile Communication Handsets at 1800MHz**
C. M. Kuo, C. W. Kuo, *National Sun Yat-Sen University, Taiwan*
- 14:30 71.4 **Unconditionally Stable ADI-FDTD Method with Resistive Source Implementation for Specific Absorption Rate (SAR) Computations**
S. Schmidt, G. Lazzi, *North Carolina State University, USA*
- 14:50 71.5 **Bounds and Estimates for Power Absorption and Radiation Efficiencies of Cellular Handsets**
D. Razansky, P. D. Einziger, *Technion - Israel Institute of Technology, Israel*
- 15:10 71.6 **SAR and Temperature Increase Induced in the Human Body Due to Body-Mounted Antennas**
A. Hirata, T. Fujino, T. Shiozawa, *Osaka University, Japan*
- 15:30 71.7 **Modeling of Bone Marrow Cells in Low-Frequency Electric Field**
R. Chiu, M. A. Stuchly, *University of Victoria, Canada*
- 15:50 71.8 **Numerical Assessment of Induced Low Frequency Currents in the Human Head Due to Mobile Phone Battery Currents**
S. Ilvonen¹, A.-P. Sihvonen², K. Kärkkäinen¹, S. Järvenpää¹, J. Sarvas¹
¹*Helsinki University of Technology, Finland*; ²*Radiation and Nuclear Safety Authority of Finland, Finland*
- 16:10 71.9 **Radiofrequencies Related Headache and Facial Pain**
S. Al-Dousary, S. M. Mir, *King Abdul Aziz University Hospital, Saudi Arabia*
- 16:30 71.10 **Theoretical Principles of Ultrawideband Microwave Space-Time Beamforming for Hyperthermia Breast Cancer Treatment**
M. C. Converse, E. J. Bond, H. Tandradinata, S. C. Hagness, B. D. Van Veen, *University of Wisconsin, USA*
- 16:50 71.11 **Treatment System of Interstitial Microwave Hyperthermia: Clinical Trials for Neck Tumor and Improvement of Antenna Elements**
K. Saito, K. Miyata, H. Yoshimura, K. Ito, *Chiba University, Japan*; Y. Aoyagi, H. Horita, *Tokyo Dentall College, Japan*
- 17:10 71.12 **FDTD Simulation of Interstitial Antenna for Bone Cancer Microwave Hyperthermic Therapy**
X. Xiaoli, W. Wenbing, *Xi'an Jiaotong University, China*

Session 72. Numerical Method Enhancements

Tuesday, June 22 13:25-17:30

URSI B

Colton

Co-Chairs: Amir Boag, *Tel Aviv University, Israel*
Frank Olyslager, *Ghent University, Belgium*

- 13:25 Opening Remarks
- 13:30 72.1 **Directional Aggregation Approach for Fast Field Evaluation**
K. Garb¹, A. Brandt², A. Boag¹
¹*Tel Aviv University, Israel;* ²*The Weizmann Institute of Science, Israel*
- 13:50 72.2 **A Fast Integral Equation Method with Fast Fourier Transform for Solving PEC Scattering Problems**
S. M. Seo, J.-F. Lee, *The Ohio State University, USA*
- 14:10 72.3 **Singularity Subtraction Technique for High Order Vectorial Basis Functions on Planar Triangles**
S. M. Jarvenpaa, M. Taskinen, *Helsinki University of Technology, Finland*
- 14:30 72.4 **Including Linear Phase Propagation Terms in the RWG Basis Functions for the Analysis of Large Structures with the Method of Moments**
J. M. Taboada, *Universidad de Extremadura, Spain*; F. Obelleiro, J. L. Rodríguez, I. García-Tíñon, *Universidad de Vigo, Spain*
- 14:50 72.5 **A High-Order Integral Equation Method for Non-Smooth Objects**
J. Liu, Q. H. Liu, *Duke University, USA*
- 15:10 72.6 **Analysis of Scattering from Dielectric Bodies Using the Single Integral and the Nystrom Method**
C. Lu, J. Yuan, B. Shanker, *Michigan State University, USA*
- 15:30 72.7 **Surface Integral Equation Formulation for the Electromagnetic Analysis of Composite Metallic and Dielectric Structures**
P. Ylä-Oijala, M. Taskinen, J. O. Sarvas, *Helsinki University of Technology, Finland*
- 15:50 72.8 **Mixed Mesh Approach for the Discretization of Hybrid Surface and Volume Equations of EM Scattering**
Z. Zeng, C. Lu, C. Yu, *University of Kentucky, USA*
- 16:10 72.9 **An Integral Equation Formulation for Electromagnetic Scattering from 3D Bodies with Anisotropic Surface Impedance Boundary Conditions**
A. Pujols, M. Sesques, *CEA (French Atomic Energy Agency), France*
- 16:30 72.10 **A Hybrid Muller and VIE Formulation for the Calculation of EM Scattering from Objects with Electric and Magnetic Material**
C. Luo, C. Lu, C. Yu, *University of Kentucky, USA*
- 16:50 72.11 **Applications of Complex Coordinates to the MLMFA**
F. Olyslager, J. De Zaeytijd, K. Cools, I. Bogaert, L. Meert, D. van de Ginste, D. Pissoort, *Ghent University, Belgium*
- 17:10 72.12 **Mixed Volume and Surface PEEC Formulation**
A. E. Ruehli¹, D. Gope^{2,1}, V. Jandhyala²
¹*IBM Research, USA*; ²*University of Washington, USA*

Session 73. Ultra-Wideband Antennas

Tuesday, June 22 13:25-17:30

AP

DeAnza III

Co-Chairs: Ahmed Kishk, *University of Mississippi, USA*
Giuliano Manara, *University of Pisa, Italy*

- 13:25 Opening Remarks
- 13:30 73.1 **A Compact Ultra-Wideband Self-Complementary Antenna with Optimal Topology and Substrate**
H. Mosallaei, K. Sarabandi, *The University of Michigan, USA*

- 13:50 73.2 **A Compact Ultra Wide Impedance Bandwidth Antenna**
R. H. Johnston, *University of Calgary, Canada*; T. C. Choi, *formerly University of Calgary, Canada*; E. Tung, *Murandi Communications, Canada*
- 14:10 73.3 **A Discussion on the Feed Configuration of Planar Monopole Antennas to Obtain Ultra Wide Band Performance**
E. Antonino-Daviu, M. Cabedo-Fabrés, M. Ferrando-Bataller, A. valero-Nogueira, *Universidad Politecnica de Valencia, Spain*
- 14:30 73.4 **Simultaneous Modeling of Impedance and Radiation Pattern Antenna for UWB Pulse Modulation**
I. Pele, A. Chousseaud, S. Toutain, *IREENA, France*
- 14:50 73.5 **Unidirectional Wideband Slot Aperture Antennas**
R. Chair, A. A. Kishk, K. F. Lee, C. E. Smith, *University of Mississippi, USA*
- 15:10 73.6 **A Low-Profile Compact Multi-Resonant Antenna for Wideband and Multi-Band Personal Wireless Applications**
M.-C. T. Huynh, W. L. Stutzman, *Virginia Polytechnic Institute and State University, USA*
- 15:30 73.7 **Design and Performance of an Ultra Wideband Ceramic-Loaded Slot Spiral**
B. A. Kramer, C.-C. Chen, J. L. Volakis, *The ElectroScience Laboratory The Ohio State University, Ohio*
- 15:50 73.8 **Investigation of Canted Compound Sector Antennas for Wideband Aperiodic Arrays**
G. Cung, J. Fladie, P. E. Mayes, J. T. Bernhard, *University of Illinois at Urbana-Champaign, USA*
- 16:10 73.9 **A Wideband Multiresonant Single-Element Slot Antenna**
N. Behdad, K. Sarabandi, *University of Michigan, USA*
- 16:30 73.10 **The Wide Band Antenna for Both IMT2000 and PCS Using U-Slot**
K.-S. Park¹, S.-Y. Choi¹, H.-B. Lee², Y.-H. Ko¹
¹*Chonbuk National University, Korea*; ²*ElectroMagnetic Korea Co.Ltd, Korea*
- 16:50 73.11 **The Design of a Wideband TEM Horn Antenna with a Microstrip-Type Balun**
K.-H. Chung, S.-H. Pyun, J.-H. Choi, *Hanyang University, Korea*
- 17:10 73.12 **A Wideband Bi-Semicircular Slot Antenna**
N. Behdad, K. Sarabandi, *University of Michigan, USA*

Session 74. Microscale and Nanoscale Electromagnetics

Tuesday, June 22 13:25-17:30

AP/URSI B: Joint Special Session

DeAnza II

Organizers: Douglas Werner, *Pennsylvania State University, USA*
Alkim Akyurtlu, *University of Massachusetts Lowell, USA*

Co-Chairs: Douglas Werner, *Pennsylvania State University, USA*
Alkim Akyurtlu, *University of Massachusetts Lowell, USA*

- 13:25 Opening Remarks
- 13:30 74.1 **Nanotechnology and Electromagnetics Research at NSF**
V. V. Varadan, *National Science Foundation, USA*
- 13:50 74.2 **Plasmonic Nanophotonics**
V. M. Shalaev, *Purdue University, USA*
- 14:10 74.3 **Multiband Planar Metallodielectric Photonic Crystals Using Frequency Selective Surface Techniques**
R. P. Drupp, J. A. Bossard, D. H. Werner, T. S. Mayer, *Penn State University, USA*
- 14:30 74.4 **Reconfigurable Infrared Frequency Selective Surfaces**
J. A. Bossard, D. H. Werner, T. S. Mayer, R. P. Drupp, *The Pennsylvania State University, USA*
- 14:50 74.5 **Strong Quadrupole Scattering from Ultra Small Metamaterial Spherical Nano-Shells**
A. Alù, *University of Roma Tre, Italy*; N. Engheta, *University of Pennsylvania, USA*
- 15:10 74.6 **Experimental Subtleties of Negative Refraction in Metamaterials**
D. R. Smith¹, A. F. Starr², J. J. Mock¹, P. M. Rye²
¹*University of California, San Diego, California*; ²*University of California, San Diego, USA*
- 15:30 74.7 **Light Manipulation With Plasmonic Nanoantennas**
V. A. Podolskiy¹, A. K. Sarychev², E. E. Narimanov¹, V. M. Shalaev²

¹*Princeton University, USA;* ²*Purdue University, USA*

- 15:50 74.8 **Electromagnetic Engineering of the Dispersion Properties of Photonic Crystal Devices**
D. W. Prather, D. M. Pustai, C. Chen, A. Sharkawy, S. Shi, J. Murakowski, *University of Delaware, USA*
- 16:10 74.9 **FDTD Modeling of Gaussian Beam Interactions with Nano-Structures for Optical Applications**
R. W. Ziolkowski, *The University of Arizona, USA*
- 16:30 74.10 **Investigation of Effective Medium Theories for Micro- and Nano-Scale Electromagnetic Metamaterials**
N. Wongkasem, A. Akyurtlu, *University of Massachusetts Lowell, USA*
- 16:50 74.11 **Photonic Nanojets**
Z. Chen, A. Taflove, V. Backman, *Northwestern University, USA*
- 17:10 74.12 **Research on the Possibility of Nano-Tube Antenna**
Z. Qi, W. Rui, *University of Science & Technology of China, China*; D. Wenwu, *Tianjing University, China*

Session 75. Low Profile Antennas for Wireless Communications

Tuesday, June 22 13:25-17:30

AP

DeAnza I

Co-Chairs: Mohammad Ali, *University of South Carolina, USA*
Fan Yang, *University of California Los Angeles, USA*

- 13:25 Opening Remarks
- 13:30 75.1 **Dual Resonant Slot Antennas for Wireless Applications**
N. Behdad, K. Sarabandi, *University of Michigan, USA*
- 13:50 75.2 **A Novel Dual-fed, Self-Diplexing PIFA and RF Front-end (PIN-DF2-PIFA)**
K. R. Boyle, *Philips Research Laboratories, England*; M. Udink, A. de Graauw, *Philips Semiconductors, The Netherlands*; L. P. Ligthart, *Delft University, The Netherlands*
- 14:10 75.3 **A Low Profile Surface Wave Antenna Equivalent to a Vertical Monopole Antenna**
F. Yang, A. Aminian, Y. Rahmat-Samii, *UCLA, USA*
- 14:30 75.4 **Metal-Plate Shorted T-shaped Monopole for Internal Laptop Antenna for 2.4/5 GHz WLAN Operation**
C.-M. Su¹, W.-S. Chen², K.-L. Wong¹
¹*National Sun Yat-Sen University, Taiwan*; ²*Cheng Shiu University, Taiwan*
- 14:50 75.5 **Planar Inverted-F Antenna with a Hollow Shorting Cylinder for Internal Mobile Phone Antenna**
S.-L. Chien¹, H.-T. Chen², C.-M. Su¹, F.-R. Hsiao¹, K.-L. Wong¹
¹*National Sun Yat-Sen University, Taiwan*; ²*Military Academy, Taiwan*
- 15:10 75.6 **The Effects of the Handset Case, Battery, and Human Head on the Performance of a Triple-Band Internal Antenna**
D.-U. Sim, S.-O. Park, *Information and Communications University, Korea*
- 15:30 75.7 **Compact Wideband Dual-Polarized Microstrip Patch Antenna**
K. Rambabu, M. Z. Alam, J. Bornemann, M. A. Stuchly, *University of Victoria, Canada*
- 15:50 75.8 **Wideband and Reduced Size Microstrip Slot Antennas for Wireless Applications**
S. I. Latif, L. Shafai, *University of Manitoba, Canada*
- 16:10 75.9 **Wideband Dipole Antenna for WLAN**
Z. Zhang¹, M. F. Iskander², J. C. Langer¹, J. Mathews¹
¹*Amphenol T&M Antennas, USA*; ²*University of Hawaii at Manoa, USA*
- 16:30 75.10 **A Capacitively Coupled Polymeric Internal Antenna**
K. M. Z. Shams, M. Ali, *University of South Carolina, USA*
- 16:50 75.11 **A Planar Loop Sector Antenna for WLAN Card Terminal**
H. Uno, Y. Saito, *Panasonic Mobile Communications Kanazawa R&D Lab. Co.,Ltd., Japan*; G.-I. Ohta, Y. Koyanagi, K. Egawa, *Panasonic Mobile Communications Co.,Ltd., Japan*
- 17:10 75.12 **Radiation Characteristics of Ob-Glass Mobile Antennas for Digital Terrestrial Television**
S.-I. Matsuzawa, K. Sato, K. Nishikawa, *Toyota Central R&D Labs., Inc., Japan*

Session 76. High Frequency and Asymptotic Methods

Tuesday, June 22 13:25-17:30

AP

Bonsai I

Co-Chairs: Roberto Tiberio, *University of Siena, Italy*
Piergiorgio L.E. Uslenghi, *University of Illinois at Chicago, USA*

- 13:25 **Opening Remarks**
- 13:30 76.1 **Gaussian Beams Representation Based on Periodic Frames for Radiation from Cylindrical Apertures**
C. Letrou, *INT/GET, France*; A. Boag, E. Heyman, *Tel Aviv University, Israel*
- 13:50 76.2 **Study of Polarizing Grid Response to a Field Expanded into Gaussian Beam Modes**
F. Martín, M. Sierra-Castañer, L. de-Haro, E. García, *Universidad Politécnica de Madrid, Spain*; J. Martin, *Centro Superior de Investigaciones Científicas, Spain*
- 14:10 76.3 **Surface Wave-Space Wave Diffraction Mechanisms at the Edge of Joined Planar Screens**
R. Tiberio, A. Polemi, A. Toccafondi, *University of Siena, Italy*
- 14:30 76.4 **Diffraction at the Vertex of a Quarter Plane**
M. Albani, *University of Messina, Italy*; F. Capolino, S. Maci, *University of Siena, Italy*
- 14:50 76.5 **Virtual Rays for Diffraction Coefficients of Composite Wedge**
S.-Y. Kim, *Korea Institute of Science and Technology, Korea*
- 15:10 76.6 **Radiation of Spiral Antennas in the Presence of BOR Radome Structure based on Physical Optics Analysis**
H.-T. Chou, Y.-T. Hsiao, *Yuan Ze University, Taiwan*
- 15:30 76.7 **Novel Uniform Asymptotic Solutions for High-Frequency Scattered Electromagnetic Fields by a Dielectric Cylinder**
T. Ida, T. Ishihara, *National Defense Academy, Japan*
- 15:50 76.8 **Comparing Xpatch, FISC, and ScaleME Using a Cone-Cylinder**
M. L. Hastriter, *Air Force Institute of Technology, USA*; W. C. Chew, *University of Illinois, USA*
- 16:10 76.9 **A Fast Hybrid Analytical and Numerical Physical Optics Analysis of Very Large Cylindrical Reflectors with Linear Feed Arrays**
K. Tap, P. H. Pathak, *Ohio State University, USA*
- 16:30 76.10 **High-Frequency Analysis of Irregularly Contoured Planar Phased Tapered Arrays**
E. Martini, S. Maci, A. Toccafondi, R. Tiberio, *University of Siena, Italy*
- 16:50 76.11 **Analysis of Teh Elettromagnetic Behavior of a Slot Finite Aperture Throught an Hibrid 2d Wiener-Hopf Technique**
R. E. Zich, D. Monopoli, *Politecnico di Milano, Italy*; V. Daniele, *Politecnico di Torino, Italy*
- 17:10 76.12 **High-Frequency Radiation Pattern of Slot Antenna on a General Paraboloid of Revolution**
C. K. Srinivas, J. Sunithamma, R. M. Jha, *National Aerospace Laboratories, India*

Session 77. Electromagnetic Theory

Tuesday, June 22 13:25-17:30

AP/URSI B

Bonsai II

Co-Chairs: Robert Nevels, *Texas A&M University, USA*
Edmund K. Miller, *Los Alamos National Laboratory (retired), USA*

- 13:25 **Opening Remarks**
- 13:30 77.1 **Comparison of the Radiation Properties a Sinusoidal Current Filament and a PEC Dipole of Vanishing Radius**
E. K. Miller, *Los Alamos National Laboratory (retired), USA*
- 13:50 77.2 **A New Sommerfeld-Watson Transform in 3D**
M.-K. Li, W. C. Chew, *University of Illinois at Urbana-Champaign, USA*
- 14:10 77.3 **Connection Between Radiation Resistances of Antenna in Rectangular Waveguide and in Free-Space**
P. V. Nikitin, *University of Washington, USA*; D. D. Stancil, *Carnegie Mellon University, USA*

- 14:30 77.4 **Modes of Elliptical Cylinder Dielectric Resonator and its Resonant Frequencies**
A. Tadjalli, A. R. Sebak, *Concordia University, Canada*; T. A. Denidni, *INRS-EMT, Canada*
- 14:50 77.5 **Equivalent Circuit of an Aperture-Coupled Lossy Cavity**
Y. Huang, *Tulane University, USA*
- 15:10 77.6 **A Circular Cylindrical Reentrant Cavity with a Cylindrical Circumferential Slot as an Antenna: An Attempt Towards Miniaturization**
G.-S. Chae, *Cheonan University, Korea*; M. P. Abegaonkar, Y.-K. Cho, *Kyungpook National University, Korea*
- 15:30 77.7 **Lagrangian Formulation for Inverse Source Problems: Minimum Energy and Reactive Power Constraints**
E. A. Marengo, A. J. Devaney, *Northeastern University, USA*; F. K. Gruber, *University of Central Florida, USA*
- 15:50 77.8 **The Electromagnetic Field in a 1-D Lossy Medium Based on a Maxwell Equation Propagator**
R. D. Nevels, J. Jeong, *Texas A&M University, USA*
- 16:10 77.9 **Comparison Between a Fourier-Harmonic and a Modal Expansion of the Electromagnetic Fields in Complex Media with Irregular Boundaries**
E. Bahar, P. Crittenden, *University of Nebraska-Lincoln, USA*
- 16:30 77.10 **Wheeler's Law and Related Issues in Integrated Antennas**
H. Contopanagos, S. Rowson, L. Desclos, *Ethertronics, USA*
- 16:50 77.11 **Compact Visualization of Electromagnetic Time-Harmonic Fields**
J. E. Roy, *Communications Research Centre Canada, Canada*
- 17:10 77.12 **Calculating the per-Unit-Length Circuit Parameters of a Coaxial Transmission Line Using Singularity Functions**
A. S. Inan, P. M. Osterberg, *University of Portland, USA*

Session 78. EBG Antenna Applications

Tuesday, June 22 13:25-15:30

AP/URSI B

Bonsai III

Co-Chairs: Daniel Sievenpiper, *HRL Laboratories LLC, USA*
Constantin Simovski, *Helsinki University of Technology, Finland*

- 13:25 Opening Remarks
- 13:30 78.1 **Application of EBG Substrates to Design Ultra-Thin Wideband Directional Dipoles**
M. F. Abedin, M. Ali, *University of South Carolina, USA*
- 13:50 78.2 **Bandwidth-Enhanced Microstrip Triangular Antenna with PBG Structure**
G. Hua, *Southeast University, China*
- 14:10 78.3 **Bandwidth Enhancement for Multi-Band Slot Antenna by PBG Feed**
B. Chen, B. L. Ooi, F. Hong, *National University of Singapore, Singapore*
- 14:30 78.4 **Novel Microceramic Structures for the Design of Monolithic Millimeter-Wave Passive Front-End Components**
K. F. Brakora, K. Sarabandi, *University of Michigan, USA*
- 14:50 78.5 **An Improved Finite Difference Eigenvalue Algorithm for the Analysis of Photonic Crystal Band Structures**
C.-P. Yu, H.-C. Chang, *National Taiwan University, Taiwan*
- 15:10 78.6 **Simulation of the Finite Photonic Crystals and HF Circuits Based on Complex Materials**
R. S. Zaridze, D. D. Karkashadze, A. Y. Bijamov, V. Tabatadze, I. Paroshina, *Tbilisi State University, Georgia*

Session 79. Radar Imagery

Tuesday, June 22 13:25-16:50

AP/URSI B

Ironwood

Co-Chairs: David Chambers, *Lawrence Livermore National Laboratory, USA*
Michael Fiddy, *University of North Carolina, USA*

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| 13:25 | Opening Remarks |
| 13:30 79.1 | Generalized Time-Reversal Imaging Considering Multiple Scattering Effects E. A. Marengo ¹ , F. K. Gruber ² , A. J. Devaney ¹ ¹ Northeastern University, USA; ² University of Central Florida, USA |
| 13:50 79.2 | Two-Dimensional Scattering Center Extraction Using Super-resolution Techniques Y. Wang ¹ , J. Chen ² , Z. Liu ¹ ¹ Nanjing University of Science & Technology, China; ² Nanjing Research Institute of Electronics Technology, China |
| 14:10 79.3 | Simulation of a Ground Penetrating Radar Environment by Means of FDTD Methods Using an Automatic Control Approach A. Tegatz, A. Joestingmeier, T. Meyer, A. S. Omar, <i>Institute for Electronic, Signal Processing, Microwave and Communication Engineering, Germany</i> |
| 14:30 79.4 | A Fast Algorithm of 3-Dimensional Imaging for Pulse Radar Systems T. Sakamoto, T. Sato, <i>Kyoto University, Japan</i> |
| 14:50 79.5 | Maximum Likelihood-Based Range Alignment for ISAR Imaging X. Qiu, <i>Nanjing Post and Tele. University, China</i> ; Y. Zhao, <i>Nanjing Normal University, China</i> |
| 15:10 79.6 | Phase Compensation in ISAR Imaging: Comparison Between Maximum Likelihood-Based Approach and Minimum Entropy-Based Approach X. H. Qiu, <i>Nanjing Post and Telecommunication University, China</i> ; Y. Zhao, <i>Nanjing Normal University, China</i> ; A. Heng Wang Chen, S. Y. Yeo, <i>DSO National Laboratory, Singapore</i> |
| 15:30 79.7 | Site-Specific Simulation of Clutter-Limited Radar Systems B. Cobo, L. Valle, R. P. Torres, <i>University of Cantabria, Spain</i> |
| 15:50 79.8 | Radar Backscatter Analysis Using Fractional Fourier Transform I. I. Jouny, <i>Lafayette College, USA</i> |
| 16:10 79.9 | Landmine Detection Using Fractional Fourier Features I. I. Jouny, <i>Lafayette College, USA</i> |
| 16:30 79.10 | Multiscale Segmentation of Remotely Sensed Images Using Pairwise Markov Chains I. Papila, <i>Istanbul Technical University, Turkey</i> ; O. Ersoy, <i>Purdue University, Indiana</i> |

Session 80. Waveguide Theory & Filter Applications

Tuesday, June 22 13:25-17:30 AP Cottonwood

Co-Chairs: Akira Ishimaru, *University of Washington, USA*
Weng Chew, *University of Illinois at Urbana-Champaign, USA*

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|------------|---|
| 13:25 | Opening Remarks |
| 13:30 80.1 | Scattering by Open Metal Obstacles in a Circular Waveguide: Dyadic Green's Function Approach V. A. Klymko, I. A. Eshrah, <u>A. B. Yakovlev</u> , A. A. Kishk, A. W. Glisson, <i>University of Mississippi, USA</i> |
| 13:50 80.2 | Different Preconditioning Techniques for the Efficient Simulation of 2D EC Structures D. Pissoort, D. Vande Ginste, F. Olyslager, <i>Ghent University, Belgium</i> ; E. Michielssen, <i>University of Illinois at Urbana -Champaign, USA</i> |
| 14:10 80.3 | Support Operator Method on Waveguide Problems Y. Liu, W. C. Chew, <i>University of Illinois at Urbana-Champaign, USA</i> |
| 14:30 80.4 | Mode-Matching Analysis of a Coaxial-to-Stripline Discontinuity Applied to the Modeling of a Coaxial Probe J. A. Ruiz-Cruz ¹ , K. A. Zaki ² , J. M. Rebollar ¹ ¹ Universidad Politecnica de Madrid, Spain; ² University of Maryland, USA |
| 14:50 80.5 | Full-Wave Analysis of Coaxial Probes in Rectangular Waveguide: Preliminary Results for Metal-Loaded Cavities and Coaxial to Rectangular Waveguide Transitions A. A. San Blas ¹ , F. Mira ² , <u>A. Coves</u> ¹ , M. Taroncher ³ , V. E. Boria ³ , B. Gimeno ⁴ , M. Bressan ² ¹ Universidad Miguel Hernandez de Elche, Spain; ² Universita degli Studi di Pavia, Italy; ³ Universidad Politecnica de Valencia, Spain; ⁴ Universidad de Valencia, Spain |

- 15:10 80.6 **Analysis of Waveguide Slot Array Using Virtual Cavity Method**
S.-Y. Choi¹, K.-S. Park¹, D.-C. Chung², Y.-H. Ko¹
¹*Chonbuk National University, Korea; ²Woosuk University, Korea*
- 15:30 80.7 **Dispersion Characteristics of the Periodically Loaded Corrugated Cylindrical Waveguide**
C.-H. Lee, C.-J. Lai, *National Changhua University of Education, Taiwan*
- 15:50 80.8 **Multipaction Modelling of Low-Cost H-Plane Filters Using an Electromagnetic Field Analysis Tool**
H. Esteban¹, J. V. Morro², V. E. Boria¹, C. Bachiller¹, A. A. San Blas², J. Gil¹
¹*Universidad Politecnica de Valencia, Spain; ²Universidad Miguel Hernandez, Spain*
- 16:10 80.9 **Design of Partial H-Plane Filter: a New Type of H-Plane Filter**
D.-W. Kim, J.-G. Lee, J.-H. Lee, *Hongik Univ., Korea*
- 16:30 80.10 **1-D Photonic Band Gap Structures (PBG) for Filter Applications**
X.-S. Yang, B.-Z. Wang, S. Xiao, *University of Electronic Science and Technology of China, China*
- 16:50 80.11 **Rectangular Waveguide Resonators in Planar Form for Filter Applications**
A. Shelkovnikov, D. Budimir, *Westminster University, UK*

Session 81. Frequency Selective Surfaces and Applications

Tuesday, June 22 15:30-17:30

AP

Bonsai III

Co-Chairs: Erdem Topsakal, *Mississippi State University, USA*
Le-Wei Li, *National University of Singapore, Singapore*

- 15:30 81.1 **Thick FSSs for Large Scan Angle Applications**
H. Loui, E. F. Kuester, *University of Colorado at Boulder, USA; F. Lalezari, Z. Popovic, FIRST RF Corporation, USA*
- 15:50 81.2 **Infrared Frequency Selective Surfaces**
B. Monacelli, G. D. Boreman, *University of Central Florida, USA; J. Pryor, B. A. Munk, The Ohio State University, USA; D. Kotter, Idaho National Engineering and Environmental Laboratories, USA*
- 16:10 81.3 **A Novel Technique for the Design of Frequency Selective Structures**
S. Monni^{1,2}, G. Gerini²
¹*Technical University of Eindhoven, The Netherlands; ²TNO-FEL, The Netherlands*
- 16:30 81.4 **A New Circuit Model for the Analysis of Frequency Selective Surfaces and Volumes**
E. Topsakal, *Mississippi State University, USA*
- 16:50 81.5 **The Impact of Frequency Selective Surfaces Applied to Standard Wall Construction Materials**
G. H. H. Sung, K. W. Sowerby, A. G. Williamson, *The University of Auckland, New Zealand*
- 17:10 81.6 **Scattering of Dielectric Frequency-Selective Surfaces under Three-Dimensional Plane-Wave Incidence**
A. Coves¹, B. Gimeno², M. V. Andres², A. A. San Blas¹, J. Gil²
¹*Universidad Miguel Hernández, Spain; ²Universidad de Valencia, Spain*

Session 82. Propagation in Urban Indoor/Outdoor Environments II

Wednesday, June 23 7:55-12:00

AP: Special Session

San Carlos I

Organizers: Linda Vahala, *Old Dominion University, USA*
Robert Kipp, *SAIC - Demaco, USA*

Co-Chairs: Linda Vahala, *Old Dominion University, USA*
Robert Kipp, *SAIC - Demaco, USA*

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| 7:55 | | Opening Remarks |
| 8:00 | 82.1 | Propagation Prediction in a Vegetated Residential Area Using the Combined Method of Ray Tracing and Diffraction X. Huang, B. Chen, H.-L. Cui, <i>Stevens Institute of Technology, USA</i> ; R. Pastore, <i>U. S. Army CECOM-RDEC, USA</i> ; J. J. Stamnes, <i>University of Bergen, Norway</i> |
| 8:20 | 82.2 | Wireless Channel Modeling Using a Miniaturized City and MM-Wave Transceivers F. Aryanfar, K. Sarabandi, <i>University of Michigan, USA</i> |
| 8:40 | 82.3 | A Closed-Loop Doppler Measurement for Velocity Estimation in Mobile, Multipath Environments W. M. Smith, D. C. Cox, <i>Stanford University, USA</i> |
| 9:00 | 82.4 | Rate and Extent of Signal Strength Change at Street Corners in Urban Environments W. M. Smith, D. C. Cox, <i>Stanford University, USA</i> |
| 9:20 | 82.5 | A Tool for Planning Electromagnetic Field Levels G. Franceschetti, A. Iodice, D. Riccio, G. Ruello, <i>Università di Napoli, Federico II, Italy</i> |
| 9:40 | 82.6 | Frequency and Time Response of Different Polarization on Indoor ISM Band Y. Kurdi, L. de-Haro, <i>Universidad Politécnica de Madrid, Spain</i> ; M. García, <i>Universidad de Vigo, Spain</i> |
| 10:00 | 82.7 | Fuzzification of Electromagnetic Interference Patterns Onboard Commercial Airliners Due to Wireless Technology M. J. Jafri ¹ , J. J. Ely ² , L. L. Vahala ¹ ¹ <i>Old Dominion University, USA</i> ; ² <i>NASA Langley Research Center, USA</i> |
| 10:20 | 82.8 | Wireless Network Simulation in Aircraft Cabins M. Youssef, L. L. Vahala, <i>Old Dominion University, USA</i> ; J. H. Beggs, <i>NASA Langley Research Center, USA</i> |
| 10:40 | 82.9 | Electromagnetic Propagation Prediction Inside Aircraft Cabins G. Hankins, L. L. Vahala, <i>Old Dominion University, USA</i> ; J. H. Beggs, <i>NASA Langley Research Center, USA</i> |
| 11:00 | 82.10 | A Deterministic Tool for Multipath Propagation Modelling E. Di Giampaolo, <i>University of L'Aquila, Italy</i> ; F. Bardati, <i>University of Rome "Tor Vergata", Italy</i> |
| 11:20 | 82.11 | Wave Propagation Modeling for Airborne Communication Systems T. Wellnitz, O. Nagy, <i>EADS Military Aircraft, Germany</i> |
| 11:40 | 82.12 | A System's View of Numerical Wave Propagation Modeling for Airborne Radio Communication Systems O. Nagy, T. Wellnitz, <i>EADS Military Aircraft, Germany</i> |

Session 83. Tribute to K.K. Mei

Wednesday, June 23 7:55-11:00

AP/URSI B: Joint Special Session

San Carlos II

Organizers: Andreas Cangellaris, *University of Illinois at Urbana-Champaign, USA*
Jiayuan Fang, *Sigrity, Inc., USA*

Co-Chairs: Andreas Cangellaris, *University of Illinois at Urbana-Champaign, USA*
Jiayuan Fang, *Sigrity, Inc., USA*

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| 7:55 | | Opening Remarks |
| 8:00 | 83.1 | Introductory Remarks A. Cangellaris, <i>University of Illinois at Urbana-Champaign, USA</i> |
| 8:20 | 83.2 | Computation of Impulse Array Fields Using Hallen's Time-Domain Integral Equation M. A. Morgan, <i>Naval Postgraduate School, USA</i> |
| 8:40 | 83.3 | A Meander Spiral Antenna H. Nakano, <i>Hosei University, Japan</i> |
| 9:00 | 83.4 | Insight Of Removing Numerical Errors In Field Computation -- Generation of Super-Absorbing Boundary Condition J. Fang, <i>Sigrity, Inc., USA</i> |
| 9:20 | 83.5 | The Measured Equation of Invariance: Thinking Out of the Box in EM Computational Methods R. Pous, <i>Technical University of Catalonia, Spain</i> |

- 9:40 83.6 **The Integral Equation MEI (IE-MEI)**
J. M. Rius, J. Parrón, E. Úbeda, A. Heldring, Universitat Politècnica de Catalunya, Spain; J. R. Mosig, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
- 10:00 83.7 **3D Scalar-formulation of IE-MEI Method for Acoustic Scattering**
N. M. Alam Chowdhury, Dhaka University of Engineering & Technology, Bangladesh; J.-I. Takada, Tokyo Institute of Technology, Japan; M. Hirose, National Institute of Advance Industrial Science & Technology, Japan
- 10:20 83.8 **A Mixed Algorithm of Domain Decomposition Method and the Measured Equation of Invariance for the Electromagnetic Problems**
W. Hong, X. X. Yin, X. An, Z. Q. Lv, T. J. Cui, Southeast University, China
- 10:40 83.9 **Simplifying PEEC Model to Transmission Line Model**
Y. Liu, City University of Hong Kong, China
- 11:00 83.10 **From MoM to Maxwellian Circuit - An Odyssey of Forty Years**
K. K. Mei, City University of Hong Kong, China

Session 84. UWB Element Design

Wednesday, June 23 7:55-10:00

AP

San Carlos III

- Chair: Keith Trott, *Raytheon Integrated Defense Systems, USA*
- 7:55 Opening Remarks
- 8:00 84.1 **7-21 GHz Wideband Phased Array Radiator**
K. D. Trott, R. V. Cummings, R. J. Cavener, M. R. Deluca, J. P. Biondi, Raytheon Integrated Defense Systems, USA
- 8:20 84.2 **A Low Cross-Polarized Antipodal Vivaldi Antenna Array for Wideband Operations**
S.-G. Kim, K. Chang, Texas A&M University, USA
- 8:40 84.3 **Ultra Wideband Exponentially-Tapered Antipodal Vivaldi Antennas**
S.-G. Kim, K. Chang, Texas A&M University, USA
- 9:00 84.4 **Transient Characteristics of Integrated Dipole Antennas on Silicon for Ultra Wideband Wireless Interconnects**
S. Watanabe, K. Kimoto, T. Kikkawa, Hiroshima University, Japan
- 9:20 84.5 **Printed L-Probe Antenna on Multi-Layered PCB**
Q. Xue, Y. F. Liu, K.-M. Shum, City University of Hong Kong, China
- 9:40 84.6 **Microstrip-Fed Wide Slot Antenna with Wide Operating Bandwidth**
Y. F. Liu, K. L. Lau, Q. Xue, C. H. Chan, City University of Hong Kong, China

Session 85. Evolutionary Optimization Techniques in Applied Electromagnetics

Wednesday, June 23 7:55-12:00

AP: Special Session

San Carlos IV

Organizers: Yahya Rahmat-Samii, *University of California at Los Angeles, USA*
Eric Michielssen, *University of Illinois at Urbana-Champaign, USA*

Co-Chairs: Yahya Rahmat-Samii, *University of California at Los Angeles, USA*
Eric Michielssen, *University of Illinois at Urbana-Champaign, USA*

- 7:55 Opening Remarks
- 8:00 85.1 **Particle Swarm Optimization (PSO) for Reflector Antenna Shaping**
D. Gies, Y. Rahmat-Samii, University of California, Los Angeles, USA

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| 8:20 | 85.2 | Particle Swarm Optimization of a Modified Bernstein Polynomial for Conformal Array Excitation Synthesis <u>D. W. Boeringer</u> , D. H. Werner, <i>The Pennsylvania State University, USA</i> |
| 8:40 | 85.3 | Vector Evaluated Particle Swarm Optimization (VEPSO): Optimization of a Radiometer Array Antenna D. Gies, <u>Y. Rahmat-Samii</u> , <i>University of California, Los Angeles, USA</i> |
| 9:00 | 85.4 | A Hybrid Approach for the Optimal Synthesis of Pencil Beams Through Array Antennas T. Isernia ¹ , F. Ares Pena ² , O. M. Bucci ³ , M. D'Urso ³ , <u>J. Fondevila Gomez</u> ² , J. A. Rodriguez Gonzalez ² ¹ <i>Univ. Mediterranea di Reggio Calabria, Italy</i> ; ² <i>Universidad de Santiago de Compostela, Spain</i> ; ³ <i>Universita Federico II di Napoli, Italy</i> |
| 9:20 | 85.5 | Progressive Evolution of Fractal Random Arrays by Generator Mitosis <u>J. S. Petko</u> , D. H. Werner, <i>Pennsylvania State University, USA</i> |
| 9:40 | 85.6 | Solution Strategies Based on Innovative Evolutionary Optimization Techniques for Microwave Imaging Applications <u>A. Massa</u> ¹ , S. Caorsi ² , M. Donelli ¹ , D. Franceschini ¹ , M. Pastorino ³ ¹ <i>University of Trento, Italy</i> ; ² <i>University of Pavia, Italy</i> ; ³ <i>University of Genoa, Italy</i> |
| 10:00 | 85.7 | Evolutionary Design of an X-Band Antenna for NASA's Space Technology 5 Mission <u>J. D. Lohn</u> ¹ , D. S. Linden ² , G. D. Hornby ¹ , B. F. Kraus ¹ , A. Rodriguez ³ , S. Seufert ³ ¹ <i>NASA Ames Research Center, USA</i> ; ² <i>Linden Innovation Research, USA</i> ; ³ <i>NASA Goddard Space Flight Center, USA</i> |
| 10:20 | 85.8 | Electrically Small Genetic Antenna Immersed in a Dielectric <u>E. E. Altshuler</u> , <i>Air Force Research Laboratory, USA</i> |
| 10:40 | 85.9 | A Complimentary Self-Structuring Antenna for Use in a Vehicle Environment <u>J. E. Ross</u> ¹ , E. J. Rothwell ² , S. Preschutti ¹ ¹ <i>Preschutti and Associates, USA</i> ; ² <i>Michigan State University, USA</i> |
| 11:00 | 85.10 | Optimization of Dual-Band Meander-Line Polarizer Plates Using a Hybrid Evolutionary Programming Algorithm <u>A. Hoofar</u> , <i>Villanova University, USA</i> ; R. Sun, <i>Michigan State University, USA</i> |
| 11:20 | 85.11 | Design of Active Planar Antennas Based on Circuit/Full-Wave Co-Optimization <u>H. Rogier</u> , D. De Zutter, B. De Mulder, J. Vandewege, <i>Ghent University, Belgium</i> |
| 11:40 | 85.12 | Bandwidth Optimization of the E-shaped Microstrip Antenna Using the Genetic Algorithm Based on Fuzzy Dececision Making A. A. Lotfi, F. Hojjat Kashani, <i>Iran University of Science and Technology, Iran</i> ; <u>K. Barkeshli</u> , <i>Sharif University of Technology, Iran</i> |

Session 86. Waveguide Slots and Arrays

Wednesday, June 23 7:55-12:00

AP

Ferrante III

Co-Chairs: John Papapolymerou, *Georgia Institute of Technology, USA*
Ari Viitamanen, *Helsinki University of Technology, Finland*

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| 7:55 | Opening Remarks |
| 8:00 | Design of a Circumferential Slot Antenna on a Sectoral Cylindrical Cavity Excited by a Probe <u>N. Pasri</u> , <i>Burapha University, Thailand</i> ; C. Phongcharoenpanich, M. Krairiksh, <i>King Mongkuts Institute of Technology Ladkrabang, Thailand</i> |
| 8:20 | Equivalent Circuit of Radiating Longitudinal Slots in Substrate Integrated Waveguide <u>H.-C. Lu</u> , T.-H. Chu, <i>National Taiwan University, Taiwan</i> |
| 8:40 | Equivalent Network Modeling of Slot Coupled Microstripline to Waveguide Transition <u>W. H. Kim</u> , J. W. Shin, J. P. Kim, <i>Chung-Ang University, Korea</i> |
| 9:00 | Full-Model Analysis of a Radial Line Slot Antenna Including the Feeder and Improvement of Aperture Field Uniformity by Shift of Position of Each Slot Pair in the Radial Direction <u>K. Sudo</u> , J. Hirokawa, M. Ando, <i>Tokyo Institute of Technology, Japan</i> ; M. Sierra-Castaner, <i>Universidad Politecnica de Madrid, Spain</i> |
| 9:20 | Length Reduction of a Short-Slot Directional Coupler in a Single-Layer Dielectric Substrate Waveguide by |

- Removing Dielectric near the Side Walls of the Coupler**
S.-I. Yamamoto, J. Hirokawa, M. Ando, *Tokyo Institute of Technology, Japan*
- 9:40 86.6 **Reflection and Transmission Coefficients for Vertical and Horizontal Slots in the Broad Wall of a Rectangular Waveguide**
J. C. Young, J. Hirokawa, M. Ando, *Tokyo Institute of Technology, Japan*
- 10:00 86.7 **Novel Transition Between Microstrip and Slotline**
Y. Zhang, B.-Z. Wang, J. Hong, *University of Electronic Science and Technology of China, China*
- 10:20 86.8 **Waveguiding Properties of a Line of Periodically Arranged Dipoles over Ground Plane**
A. J. Viitanen, S. A. Tretyakov, *Helsinki University of Technology, Finland*
- 10:40 86.9 **A Slotted Post-wall Waveguide Array with Inter-digital Structure for 45-deg Linear and Dual Polarization**
S. Park, Y. Okajima, J. Hirokawa, M. Ando, *Tokyo Institute of Technology, Japan*
- 11:00 86.10 **Method of Moments / Transmission Line Modeling for Plasma Excitation Single-layer Slotted Waveguide Arrays with Complicated Outer Baffles**
T. Hirano, J. Hirokawa, M. Ando, *Tokyo Institute of Technology, Japan*; T. Ide, A. Sasaki, K. Azuma, Y. Nakata, *Advanced LCD Technologies Development Center Co. Ltd., Japan*
- 11:20 86.11 **Parasitic Strip Dipoles to Suppress Grating Lobes in Waveguide Transverse Slot Array**
M. G. S. Hossain, J. Hirokawa, M. Ando, *Tokyo Institute of Technology, Japan*
- 11:40 86.12 **Polarization Isolation Between Two Center-Feed Single-Layer Waveguide Arrays Arranged Side-by-Side**
Y. Tsunemitsu, Y. Miura, Y. Kazama, *Japan Radio Co., Ltd., Japan*; S. Park, J. Hirokawa, M. Ando, *Tokyo Institute of Technology, Japan*; N. Goto, *Takushoku University, Japan*

Session 87. Non-Conventional Antennas

Wednesday, June 23 7:55-12:00

AP

Ferrante II

Co-Chairs: Deb Chatterjee, *University of Missouri Kansas City, USA*
Alina Moussessian, *Jet Propulsion Laboratory, USA*

- 7:55 Opening Remarks
- 8:00 87.1 **Novel Patch Antenna for EGSM/DCS/PCS Base-Station Application**
F. S. Chang¹, W. K. Su², C. H. Twu¹, K. L. Wong³
¹*Military Academy, Taiwan*, ²*National Defense University, Taiwan*; ³*National Sun Yat-Sen University, Taiwan*
- 8:20 87.2 **Thin-Membrane Aperture-Coupled L-Band Patch Antenna**
J. Huang, A. Moussessian, *Jet Propulsion Laboratory, USA*
- 8:40 87.3 **Liquid Antenna Systems**
Y. P. Kosta, *Charotar Institute of Technology-Changa, India*; S. Kosta, *Pacific Crest Corporation, California*
- 9:00 87.4 **A Crown Square Microstrip Fractal Antenna**
P. Dehkhoda, A. Tavakoli, *AmirKabir University of Technology, Iran*
- 9:20 87.5 **Study of Tunable Aperture Coupled Microstrip Antennas on Ferrite Substrates**
G. León, R. R. Boix, M. J. Freire, F. Medina, *Universidad de Sevilla, Spain*
- 9:40 87.6 **Folded Microstrip Antenna**
Y. R. Cha, C. S. Lee, *Southern Methodist University, USA*
- 10:00 87.7 **Numerical Analysis of A Novell Balloon Antenna**
G. Chi, B. Li, Y. Liu, *Shanghai Jiaotong University, China*
- 10:20 87.8 **Enhanced Performance of a Suspended Patch Antenna with Stacked EBG Utilization**
L. Yang, W. Chen, M. Fan, Z. Feng, *Tsinghua University, China*
- 10:40 87.9 **CPW-fed Compact Equilateral Triangular-Ring Slot Antenna**
J.-S. Chen, *Cheng Shiu University, Taiwan*
- 11:00 87.10 **Analysis of Slot Loaded Microstrip Patch Antenna**
Shivnarayan, B. R. Vishwakarma, *Institute of Technology, Banaras Hindu University, India*
- 11:20 87.11 **Performance of Two Empirical Techniques for Optimized Design of Wideband, U-Slot Antennas Using Commercial CAD Tools**
V. Natarajan, E. A. Chettiar, D. Chatterjee, *University of Missouri Kansas City (UMKC), USA*

- 11:40 87.12 **Analysis of Printed Antennas Embedded in a Composite Material Loaded With Lightning Protection Metallic Screen.**
M. D. Deshpande, *NASA Langley Research Center, Hampton, USA*

Session 88. Microwave Imaging and Reconstruction

Wednesday, June 23 7:55-12:00

AP/URSI K

Ferrante I

Co-Chairs: Susan C. Hagness, *University of Wisconsin, USA*
Gianluca Lazzi, *North Carolina State University, USA*

- 7:55 Opening Remarks
- 8:00 88.1 **Radar-Based Microwave Imaging for Breast Cancer Detection: Tumor Sensing with Cross-Polarized Reflections**
E. C. Fear, J. Yun, R. H. Johnston, *University of Calgary, Canada*
- 8:20 88.2 **Tissue Sensing Adaptive Radar for Breast Cancer Detection: Investigations of Reflections from the Skin**
T. C. Williams, E. C. Fear, D. W. Westwick, *University of Calgary, Canada*
- 8:40 88.3 **Numerical Analysis of Microwave Detection of Breast Tumours Using Synthetic Focussing Techniques**
R. Nilavalan, J. Leendertz, I. J. Craddock, A. Preece, R. Benjamin, *University of Bristol, UK*
- 9:00 88.4 **Near-field Scanning Microwave Microscopy for Detection of Subsurface Biological Anomalies**
X. Wu, O. M. Ramahi, *University of Maryland, USA*
- 9:20 88.5 **Biomedical Applications of Sodium Meta Silicate Gel as Coupling Medium for Microwave Medical Imaging**
V. Hamsakutty, A. Lonappan, J. Jacob, G. Bindu, V. Thomas, A. V. P. Kumar, K. Mathew, *Cochin University of Science & Technology, India*
- 9:40 88.6 **Impact of Dispersion in Breast Tissue on High-Resolution Microwave Imaging for Early Breast Tumor Detection**
G. Wang, *Jiangsu University, China*
- 10:00 88.7 **Microwave-Based Breast Cancer Detection: A Detection-Theoretic Approach**
S. K. Davis, H. Tandradinata, M. Lazebnik, S. C. Hagness, B. D. Van Veen, *University of Wisconsin -- Madison, USA*
- 10:20 88.8 **A Three Dimensional Multiresolution Impedance Method for Low-Frequency Bioelectromagnetic Interaction**
P. K. Brown, G. Lazzi, *North Carolina State University, USA*
- 10:40 88.9 **A 2-D Electrical Impedance Tomography System and Image Reconstruction**
G. Shi¹, K. H. Lim¹, J. Di Sarro¹, J. Hu², R. T. George¹, G. Ybarra¹, W. T. Joines¹, Q. H. Liu¹
¹Duke University, USA; ²Illinois Institute of Technology, USA
- 11:00 88.10 **Modeling the Resonance Phenomenon of Electromagnetic Waves Scattered from Malignant Breast Cancer Tumors**
M. El-Shenawee, *University of Arkansas, USA*
- 11:20 88.11 **Quasistatic Reconstruction of Layered Biological Tissues**
M. Dolgin, P. D. Einziger, *Technion - Israel Institute of Technology, Israel*
- 11:40 88.12 **Investigation of Wideband Spiral Antennas on Flexible Substrates for Use in Biomedical Applications**
M. D. Seymour, J. Venkataraman, *Rochester Institute of Technology, USA*

Session 89. Patch Arrays

Wednesday, June 23 7:55-12:00

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Co-Chairs: Eugene Ngai, *MIT Lincoln Laboratory, USA*
P.H. Pathak, *The Ohio State University, USA*

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| 7:55 | | Opening Remarks |
| 8:00 | 89.1 | Design of a Novel Shaped-Beam Conformal Antenna on a Complex Airborne Platform <i>E. C. Ngai, MIT Lincoln Laboratory, USA; H. L. Southall, Arinc Incorporated, USA; R. J. Marhefka, The Ohio State University, USA</i> |
| 8:20 | 89.2 | Design of a Broad-Band Low Cross-Polarized X-Band Antenna Array for SAR Applications <i>E. Schittler Neves, W. Elmarissi, A. Dreher, German Aerospace Center (DLR), Germany</i> |
| 8:40 | 89.3 | Cosecant-Squared Pattern Antenna for Base Station at 40 GHz <i>L. Freytag, B. Jecko, IRCOM, France</i> |
| 9:00 | 89.4 | Coplanar-Waveguide Coupled Patch-Array for Millimeter Wave Wireless Applications <i>M. Albani, University of Messina, Italy; S. Maci, University of Siena, Italy</i> |
| 9:20 | 89.5 | Planar Square and Diamond Microstrip Patch Array Antennas for Dual-Polarization Operation <i>A. Vallecchi, University of Florence, Italy</i> |
| 9:40 | 89.6 | Novel Ka-band Microstrip Antenna Fed Circular Polarized Horn Array Antenna <i>Y.-B. Jung, S.-Y. Eom, S.-I. Jeon, C.-J. Kim, ETRI, Korea</i> |
| 10:00 | 89.7 | Microstrip Patch Array Antenna with High Gain and Wideband for Tx/Rx Dual Operation at Ku-Band <i>H. S. Noh, J. S. Yun, J. M. Kim, S. I. Jeon, Electronics and Telecommunications Research Institute (ETRI), Korea</i> |
| 10:20 | 89.8 | High Gain and Broadband Microstrip Array Antenna Using Combined Structure of Corporate and Series Feeding <i>W. Choi, J. M. Kim, J. H. Bae, C. Pyo, ETRI, Korea</i> |
| 10:40 | 89.9 | Microstrip Yagi Array on Air Substrate <i>X. B. Yang, B. P. Ng, Nanyang Technological University, Singapore</i> |
| 11:00 | 89.10 | A Hybrid MoM-Asymptotic and Circuit Based Analysis of the Radiation/Receiving by Large Finite Patch Antenna Arrays with a Printed Feed Network <i>P. Mahachoklertwattana, P. H. Pathak, P. Janpugdee, R. J. Burkholder, The Ohio State University, USA; Y. B. Gan, National University of Singapore, Singapore</i> |
| 11:20 | 89.11 | A Novel Antenna Array for LMDS Applications <i>G. Liu, H. Jiang, Y. Long, Sun Yat-Sen University, China</i> |
| 11:40 | 89.12 | Simple Satellite-Tracking Dual-Band Triangular-Patch Array Antenna for ETS-VIII Applications <i>J. T. Sri Sumantyo, K. Ito, D. Delaune, T. Tanaka, H. Yoshimura, Chiba University, Japan</i> |

Session 90. Antennas for UWB Radio Systems

Wednesday, June 23 7:55-12:00

AP: Special Session

DeAnza III

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| Organizers: | Zhi Ning Chen, <i>Institute for Infocomm Research, Singapore</i> Thorsten Hertel, <i>Alereon, Inc., USA</i> |
| Co-Chairs: | Zhi Ning Chen, <i>Institute for Infocomm Research, Singapore</i> Thorsten Hertel, <i>Alereon, Inc., USA</i> |
| 7:55 | Opening Remarks |
| 8:00 | 90.1 Antennas for UWB Communications: A Novel Filtering Perspective <i>S. J. Zwierzchowski, Gnostar Inc./University of Calgary, Canada; M. Okoniewski, University of Calgary, Canada</i> |
| 8:20 | 90.2 Planar Half-Disk Antenna Structures for Ultra-Wideband Communications <i>T. Yang, W. A. Davis, Virginia Polytechnic Institute & State University, USA</i> |
| 8:40 | 90.3 Characteristics of Planar Dipoles Printed on Finite-size PCBs in UWB Radio Systems <i>Y. Zhang, Z. N. Chen, M. Y. W. Chia, Institute for Infocomm Research, Singapore</i> |
| 9:00 | 90.4 Koch Island Fractal Ultra Wideband Dipole Antenna <i>E. Lule, T. Babij, Florida International University, USA; K. Siwiak, TimeDerivative, Inc, USA</i> |
| 9:20 | 90.5 Bow-Tie Antenna for UWB Communication Frequency <i>K. Yekeh Yazdandoost, R. Kohno, Communication Research Laboratory, Japan</i> |

- 9:40 90.6 **Smart Antennas for Spatial Rake UWB Systems**
H. G. Schantz, *Next-RF, Inc., USA*
- 10:00 90.7 **Short-Range UWB Antenna Measurements**
T. W. Hertel, *Alereon, Inc., USA*
- 10:20 90.8 **Transfer Functions Measurement for UWB Antenna**
X. Qing, Z. N. Chen, *Institute for Infocomm Research, Singapore*
- 10:40 90.9 **Frequency-Domain Pattern Extraction from Pole/residue Model of UWB Antenna System**
S. Licul, W. A. Davis, *Virginia Polytechnic Institute and State University, USA*
- 11:00 90.10 **The Effect of Frequency-Dependent Radiation Pattern on UWB Antenna Performance**
J. S. McLean¹, H. D. Foltz², R. Sutton¹
¹*TDK Corporation, USA*; ²*University of Texas-Pan American, USA*
- 11:20 90.11 **Antenna Modelling Using Linear Elements, with Applications to UWB**
G. Lu¹, I. Korisch², L. Greenstein¹, P. Spasojevic¹
¹*Rutgers University, USA*; ²*Lucent Technologies, USA*
- 11:40 90.12 **Improved Resistively-Loaded Vee Dipole for Ground-Penetrating Radar Applications**
K. Kim, W. R. Scott, Jr., *Georgia Institute of Technology, USA*

Session 91. Metamaterials I

Wednesday, June 23 7:55-12:00

AP/URSI B: Joint Special Session

DeAnza II

Organizers: Richard Ziolkowski, *University of Arizona, USA*
Nader Engheta, *University of Pennsylvania, USA*

Co-Chairs: Richard Ziolkowski, *University of Arizona, USA*
Nader Engheta, *University of Pennsylvania, USA*

- 7:55 Opening Remarks
- 8:00 91.1 **Sommerfeld Integrals for LH Materials**
W. C. Chew, *University of Illinois at Urbana-Champaign, USA*
- 8:20 91.2 **Determination of Effective Material Parameters for a Meta-material Based on Analysis of Local Fields**
R. P. Haley, Jr., P. K. Mercure, *The Dow Chemical Company, USA*
- 8:40 91.3 **Analysis of Electrically-Small Metamaterials with Lumped Tuning Elements Through a Time Domain Coupled EM-Circuit Solver**
V. Jandhyala, G. Ouyang, C. Yang, A. Ishimaru, Y. Kuga, *University of Washington, USA*
- 9:00 91.4 **A Network Theory for EBG Surfaces. Generalization to Any Direction of Propagation in the Azimuth Plane**
A. Cucini, M. Caiazzo, M. Nannetti, S. Maci, *University of Siena, Italy*
- 9:20 91.5 **Experimental Investigation of Subwavelength Resonator Based on Backward-Wave Meta-Material**
S. Hrabar, J. Bartolic, *University of Zagreb, Croatia*
- 9:40 91.6 **Guided Wave Propagation in H-Guides Using Double Negative Materials**
A. L. Topa, C. R. Paiva, A. M. Barbosa, *Technical University of Lisbon, Portugal*
- 10:00 91.7 **Miniaturization of a Bow-Tie Antenna with Textured Dielectric Superstrates**
D. Psychoudakis¹, S. K. C. Pillai¹, J. H. Halloran¹, J. L. Volakis^{1,2}
¹*University of Michigan, USA*; ²*The Ohio State University, USA*
- 10:20 91.8 **Design of Single and Double Negative Metamaterials by Using Genetically Optimized Frequency Selective Surfaces**
A. Monorchio, S. Barbagallo, G. Manara, *University of Pisa, Italy*
- 10:40 91.9 **Embedded-Circuit Band-Gap Metamaterials for the Design of High Performance Antenna Arrays**
K. Sarabandi, H. Mosallaei, *The University of Michigan, USA*
- 11:00 91.10 **Reciprocal Properties of Scattering from Spheres with Double Negative Coatings and Sources Within Double Negative Spherical Shells**
A. D. Kipple, R. W. Ziolkowski, *The University of Arizona, USA*
- 11:20 91.11 **Reducing Scattering from Cylinders and Spheres Using Metamaterials**
A. Alù, *University of Roma Tre, Italy*; N. Engheta, *University of Pennsylvania, USA*

- 11:40 91.12 **Radiation Characteristics of an Infinite Line Source Surrounded by Concentric Shells of Metamaterials**
M. M. Khodier, *Jordan University of Science and Technology, Jordan*
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Session 92. Antennas for WLAN and Bluetooth Applications

Wednesday, June 23 7:55-12:00

AP: Special Session

DeAnza I

Organizers: Duixian Liu, *Thomas J. Watson Research Center/IBM, USA*
Soo Liam Ooi, *Motorola Corporate EME Research Lab, USA*

Co-Chairs: Duixian Liu, *Thomas J. Watson Research Center/IBM, USA*
Soo Liam Ooi, *Motorola Corporate EME Research Lab, USA*

- 7:55 Opening Remarks
- 8:00 92.1 **A Low-Profile Omnidirectional Circularly Polarized Antenna for WLAN Access Point**
K.-L. Wong, F.-R. Hsiao, *National Sun Yat-Sen University, Taiwan*; C.-L. Tang, *Industrial Technology Research Institute, Taiwan*
- 8:20 92.2 **Microstrip-fed Printed Dipole Antenna for 2.4/5.2 GHz WLAN Operation**
H.-M. Chen, J.-M. Chen, P.-S. Cheng, Y.-F. Lin, *National Kaohsiung University of Applied Sciences, Taiwan*
- 8:40 92.3 **An Embedded Quad-Band WLAN Antenna for Laptop Computers and Equivalent Circuit Model**
S. Rogers, J. Scott, J. Marsh, D. Lin, *Etenna Corporation, USA*
- 9:00 92.4 **Study of the optimum orientation of Bluetooth Antennas on Wearable Transceivers**
S. Ooi, *Motorola Inc, USA*
- 9:20 92.5 **A 2.4 and 5 GHz Dual Band Antenna**
H. Okado, *Taiyo Yuden Co., Ltd., Japan*
- 9:40 92.6 **Dual Band Coupled Floating Element PCB Antenna**
S. Fujio, T. Asano, *IBM Japan, Japan*
- 10:00 92.7 **Study and Design of a Multi-Functional Stacked Microstrip Patch Antenna**
V. K. Kunda, M. Ali, *University of South Carolina, USA*; H. S. Hwang, *Sony Ericsson Mobile Communications, USA*
- 10:20 92.8 **Printed Monopole Antennas Stacked with a Shorted Parasitic Wire for Bluetooth and WLAN Applications**
J.-Y. Jan, L.-C. Tseng, *National Kaohsiung University of Applied Sciences, Taiwan*; W.-S. Chen, Y.-T. Cheng, *Cheng Shiu University, Taiwan*
- 10:40 92.9 **A New Dual-Band Antenna for WLAN Applications**
Y.-Y. Wang, S.-J. Chung, *National Chiao Tung University, Taiwan*
- 11:00 92.10 **Small and Thin Structure Plate Type Wideband Antenna (3GHz-6GHz) for Wireless Communications**
K. Fukuchi, T. Ogawa, M. Ikegaya, H. Tate, *Hitachi Cable, Ltd., Japan*; K. Takei, *Hitachi Ltd., Japan*
- 11:20 92.11 **A Dual-band Hybrid Dielectric Antenna for Laptop Computers**
B. S. Collins, V. Nahar, S. P. Kingsley, S. Q. Zhang, *Antenova Ltd, UK*; S. Krupa, *Galtronics Inc, USA*
- 11:40 92.12 **A Branched Inverted-F Antenna for Dual Band WLAN Applications**
D. Liu, B. Gaucher, *IBM, USA*

Session 93. Hybrid and Reduced Order Numerical Methods

Wednesday, June 23 7:55-12:00

URSI B

Bonsai I

Co-Chairs: Jin-Fa Lee, *The Ohio State University, USA*
Ronald Marhefka, *The Ohio State University, USA*

| | | |
|-------|-----------------|---|
| 7:55 | Opening Remarks | |
| 8:00 | 93.1 | Efficient Interface Numerical Antenna Modeling and Environmental Simulation Codes <u>J. T. Rockway</u> , E. H. Newman, R. J. Marhefka, <i>The Ohio State University, USA</i> |
| 8:20 | 93.2 | A Lanczos Spectral Element Method for High-Speed Electronic Circuit Simulation <u>Y. Liu</u> , Q. H. Liu, <i>Duke University, USA</i> |
| 8:40 | 93.3 | A Fast Multipole Method for Green's Functions of the Form $r^{-\lambda}$ <u>I. Chowdhury</u> , V. Jandhyala, <i>University of Washington, USA</i> |
| 9:00 | 93.4 | A Symmetric FEM-IE Formulation with a Multi-Level IE-FFT Algorithm for Solving Electromagnetic Radiation and Scattering Problems <u>S. M. Seo</u> , S.-C. Lee, <u>K. Zhao</u> , J.-F. Lee, <i>The Ohio State University, USA</i> |
| 9:20 | 93.5 | Asymptotically Driven Local Basis Functions with Application to the Fast Multipole Method <u>L. Carin</u> , Z. Liu, <i>Duke University, USA</i> |
| 9:40 | 93.6 | Current Modes Identification for the Analysis of Radiation and Scattering from Large Structures <u>C. Delgado</u> , M. Fernandez, M. F. Catedra, <i>Universidad de Alcala, Spain</i> |
| 10:00 | 93.7 | Analysis of Localized Defects in Photonic Crystals Using a Source-Model Technique <u>A. Ludwig</u> , Y. Levitan, <i>Technion - Israel Institute of Technology, Israel</i> |
| 10:20 | 93.8 | Improved Full-Vectorial Finite Difference Frequency Domain Method for Dielectric Waveguides by Matching Boundary Conditions at Dielectric Interfaces <u>C.-P. Yu</u> , H.-C. Chang, <i>National Taiwan University, Taiwan</i> |
| 10:40 | 93.9 | Eigenvalues of Arbitrarily-Shaped Waveguides Using a Mixed-Element Formulation <u>G. M. Wilkins</u> , <i>Morgan State University, USA</i> ; <u>M. D. Deshpande</u> , <i>NASA Langley Research Center, USA</i> ; <u>J. M. Hall</u> , <i>Lockheed Martin, USA</i> |
| 11:00 | 93.10 | A BMIA/AIM Formulation for the Analysis of Thin Stratified Large Patch Antennas <u>F. De Vita</u> , A. Mori, P. De Vita, A. Freni, <i>University of Florence, Italy</i> |
| 11:20 | 93.11 | Domain Decomposition Method in Conjunction with DP-FETI for Modeling RCS Computation of Large Finite Arrays <u>K. Zhao</u> , M. Vouvakis, S.-C. Lee, J.-F. Lee, <i>The Ohio State University, USA</i> |
| 11:40 | 93.12 | New Numerical Methods for the Prediction of EM Scattering by Electrically Deep Cavities <u>N. Balin</u> ^{1,2,3} , A. Bendali ^{2,3} ¹ <i>MBDA-France, France</i> ; ² <i>CERFACS, France</i> ; ³ <i>MIP, France</i> |

Session 94. Finite Difference Time Domain Techniques

Wednesday, June 23 7:55-12:00

URSI B

Bonsai II

Co-Chairs: Lawrence Carin, *Duke University, USA*
Jian-Ming Jin, *University of Illinois at Urbana-Champaign, USA*

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|-------|-----------------|--|
| 7:55 | Opening Remarks | |
| 8:00 | 94.1 | Teaching the FDTD Method in the Junior Undergraduate Electromagnetics Course <u>J. R. Natzke</u> , <i>George Fox University, USA</i> |
| 8:20 | 94.2 | A Fourth-Order FDTD Scheme with Long-Time Stability <u>K.-P. Hwang</u> , <i>Intel Corporation, USA</i> |
| 8:40 | 94.3 | Time-Domain Split-Field Formulation for Both Periodic Boundary Condition and PML <u>D. Correia</u> , J.-M. Jin, <i>University of Illinois at Urbana-Champaign, USA</i> |
| 9:00 | 94.4 | Multiresolution Time-Domain Using Spatially Varying Basis Functions <u>N. Kovvali</u> , W. Lin, L. Carin, <i>Duke University, USA</i> |
| 9:20 | 94.5 | Multiresolution Time-Domain Using Ridgelet Basis Functions <u>W. Lin</u> , N. Kovvali, L. Carin, <i>Duke University, USA</i> |
| 9:40 | 94.6 | Metamaterial Modeling Using Composite Cell MRTD Techniques <u>N. Bushyager</u> , M. Tentzeris, <i>The Georgia Institute of Technology, USA</i> |
| 10:00 | 94.7 | High Order and Highly Stable MRTD Techniques: Formulation and Applications <u>C. Sarris</u> , <i>University of Toronto, Canada</i> |

- 10:20 94.8 **Efficient Indoor Wireless Modeling with a High-Order MRTD Method**
C. Sarris, A. Alighanbari, *University of Toronto, Canada*
- 10:40 94.9 **A New Domain Decomposition Approach for Solving Large Problems Using the FDTD**
H. E. AbdEl-Raouf, R. Mittra, *Pennsylvania State University, USA*
- 11:00 94.10 **An FDTD-Based Domain Decomposition Approach to the Solution of Coupling Problem Between Two Arrays**
H. E. AbdEl-Raouf, R. Mittra, *Pennsylvania State University, USA*
- 11:20 94.11 **Accurate Representation of Complex 3-D Geometries for Conformal FDTD Simulations Including Solids and Thin Sheets**
S. Benkler¹, N. Chavannes², J. Fröhlich², H. Songoro³, N. Kuster²
¹*Swiss Federal Institute of Technology (ETH), Switzerland*; ²*Foundation for Research on Information Technologies in Society (ITIS), Switzerland*; ³*Schmid & Partner Engineering AG (SPEAG), Switzerland*
- 11:40 94.12 **Efficient Analysis of On-Chip Interconnects by Compact Crank–Nicolson (CN) FDTD Method**
D. D. Wu, J. Chen, *University of Houston, USA*

Session 95. Adaptive Beamforming

Wednesday, June 23 7:55-12:00

AP

Bonsai III

Co-Chairs: Constantine Balanis, *Arizona State University, USA*
Christos Christodoulou, *University of New Mexico, USA*

- 7:55 Opening Remarks
- 8:00 95.1 **Wideband Beamforming Using Circular Arrays**
P. Ioannides, C. A. Balanis, *Arizona State University, USA*
- 8:20 95.2 **A Compact Series-Fed Microstrip Slot Antenna Array for Digital Beamforming**
S. Kim, Y. Wang, *University of California, Los Angeles, California*
- 8:40 95.3 **Efficient Calculation of Radiation Patterns for Reactively-Steered Array Antennas**
D. F. Kelley, *Bucknell University, USA*
- 9:00 95.4 **Smart MMA and GMMA Multi-Modulus Arrays for High Data Rate Channels Using QAM Signals with Dense Constellations**
S. E. El-Khamy, A. M. Gaballa, H. E. Rachwan, *Alexandria University, Egypt*
- 9:20 95.5 **New Adaptive Beamformers for Estimation of Spatially Distributed Sources**
A. Zoubir, Y. Wang, *IREENA, France*; P. Charge, *LESIA, France*
- 9:40 95.6 **Wideband Direction-of-Arrival Estimation Using Spatially Interpolated Wideband Beamformers**
T. Do-Hong, P. Russer, *Munich University of Technology, Germany*
- 10:00 95.7 **Adaptive Beamforming Arrays for Smart Antenna Systems: A Comprehensive Performance Study**
E. M. Ardi, R. M. Shubair, M. E. Mualla, *Etisalat College of Engineering, UAE*
- 10:20 95.8 **Adaptive Sidelobe Nulling Using the Positions of Selected Elements of the Phased Antenna Array**
J. A. Hejres, *University of Bahrain, Bahrain*
- 10:40 95.9 **Downlink Radiation Pattern in Adaptive Array with Mutual Coupling**
E. B. Perri, L. C. Trintinalia, *University of Sao Paulo, Brazil*
- 11:00 95.10 **An Adaptive Beamforming Approach Using Online Learning Neural Network**
X.-B. Sun, S.-S. Zhong, *Shanghai University, China*
- 11:20 95.11 **Synthesis of Antenna Arrays Using a Modified Complex Number Coded Genetic Algorithm**
Y. Fan, R. Jin, B. Liu, *Shanghai Jiaotong University, China*
- 11:40 95.12 **A Pre-FFT OFDM Adaptive Antenna Array Based on Beam-Space Channel Estimation**
B. Liu, R. Jin, Y. Fan, *Shanghai Jiao Tong Univ., China*

Session 96. Array Analysis and Optimization Techniques

Wednesday, June 23 7:55-12:00

AP

Ironwood

Co-Chairs: Kathleen Melde, *University of Arizona, USA*
Amir Zaghloul, *Virginia Polytechnic Institute and State University, USA*

- 7:55 Opening Remarks
- 8:00 96.1 **Wideband Properties of Space-Fed Overlapped Subarray Feeds**
R. J. Mailloux, Air Force Research Laboratory (AFRL), USA
- 8:20 96.2 **An Accelerated DFT-MoM for the Analysis of Large Finite Periodic Antenna Arrays in Grounded Layered Media**
P. Janpugdee, P. H. Pathak, P. Mahachoklertwattana, R. J. Burkholder, The Ohio State University, USA
- 8:40 96.3 **Comparison of MATLAB and GA Optimization for Three-Dimensional Pattern Synthesis of Circular Arc Arrays**
A. Erentok, K. L. Melde, The University of Arizona, USA
- 9:00 96.4 **Analysis of Radiation and Coupling Associated with Large Multiple Antenna Arrays on Ships**
R. J. Burkholder, K. Sertel, P. H. Pathak, J. L. Volakis, The Ohio State University, USA; S. S. Navale, Northrup Grumman Corporation, USA
- 9:20 96.5 **On the Radiation Characteristics of Finite Dual-Polarized Arrays of Tapered-Slot Antennas**
C. V. G. Craeye, Université catholique de Louvain, Belgium
- 9:40 96.6 **Full Wave Analysis of Finite Arrays on an Infinite Ground Plane Including the Mutual Coupling Effects**
J. Rubio, Universidad De Extremadura, Spain; M. A. Gonzalez, J. Zapata, Universidad Politecnica de Madrid, Spain
- 10:00 96.7 **On the Properties of Small Arrays with Closely Spaced Antenna Elements**
H. J. Chaloupka, X. Wang, University of Wuppertal, Germany
- 10:20 96.8 **Antenna and Diffraction Mode Decomposition of Mutual Coupling in Antenna Arrays**
Y. Letestu, K. Mahdjoubi, A. Sharaiha, Institut d'Electronique et de Télécommunications de Rennes, France
- 10:40 96.9 **A New General Formulation for the Entire-Domain Analysis of an Array of Arbitrarily Oriented Circular Loop Antennas**
K. Sivanand, Institute for Infocomm Research, Singapore; L. W. Li, M. S. Leong, P. S. Kooi, National University of Singapore, Singapore
- 11:00 96.10 **Sidelobe Reduction of Antenna Arrays by Deterministic Subarray Feed Line Adjustment Method**
N. Takemura, H. Miyashita, S. Makino, S. Udagawa, I. Chiba, Mitsubishi Electric Corporation, Japan
- 11:20 96.11 **Slot Array Antenna using Both-Sided MIC Technology**
K. Kodama, E. Nishiyama, M. Aikawa, Saga University, Japan
- 11:40 96.12 **Parameter Considerations of a Three-Sector Antenna Using Monopole Yagi Array on the Ground Plane by the Method of Moments**
C. Buranakunaporn, C. Phongcharoenpanich, King Mongkuts Institute of Technology Ladkrabang, Thailand

Session 97. Filter and Transmission Line Optimization

Wednesday, June 23 7:55-10:00

AP

Cottonwood

Co-Chairs: Paola Pirinoli, *Politecnico di Torino, Italy*
Jose V. Morro, *Universidad Miguel Hernández at Elche, Spain*

- 7:55 Opening Remarks
- 8:00 97.1 **Broadband Microstrip-to-CPW Feedthru Design Using Air Cavities**
Z. Shao, M. Fujise, Communication Research Laboratory, Singapore
- 8:20 97.2 **Simulation and Optimization of the Microklystrode**
J.-T. Kim, T. Y. Lee, S.-B. Ryu, U. Steinfeld, KIST-Europe Forschungs GmbH, Germany; H. Bley, University of Saarland, Germany

- 8:40 97.3 **Particle Swarm Optimization Of Microwave Microstrip Filters**
L. Matekovits¹, M. Mussetta², P. Pirinoli¹, S. Selleri³, R. E. Zich²
¹*Politecnico di Torino, Italy;* ²*Politecnico di Milano, Italy;* ³*University of Florence, Italy*
- 9:00 97.4 **Efficient Automated Design of H Plane Filters with Rounded Corners Using ASM with a Segmentation Strategy and Hybrid Optimization Techniques**
J. V. Morro¹, H. Esteban², V. E. Boria², C. Bachiller², S. Cogollos², A. Coves¹
¹*Universidad Miguel Hernandez, Spain;* ²*Universidad Politecnica de Valencia, Spain*
- 9:20 97.5 **Equivalent Circuits Modeling of Coplanar Waveguide Structures Using Simulated Annealing Method**
C. Gao, Y. Wang, D. Chen, *Southeast University, China*
- 9:40 97.6 **A Functional Genome Optimization Method for CPW Filters Design**
C. H. Chien, A. S. Liu, R. B. Wu, *National Taiwan University, Taiwan*
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Session 98. Handset Antennas

Wednesday, June 23 10:00-12:00

AP

San Carlos III

- Co-Chairs: Eva Antonino-Daviu, *Universidad Politecnica de Valencia, Spain*
Kendall Casey, *SRI International*
- 10:00 98.1 **Whip-PIFA Combination in Wireless Handset Application: A Hybrid Circuit Model and Full Wave Analysis**
Z. Li, Y. Rahmat-Samii, *University of California, Los Angeles, USA*
- 10:20 98.2 **Analysis of the Coupled Chassis-Antenna Modes in Mobile Handsets**
E. Antonino-Daviu, M. Cabedo-Fabrés, M. Ferrando-Bataller, J. I. Herranz-Herruzzo, *Universidad Politecnica de Valencia, Spain*
- 10:40 98.3 **A Low-Profile Folded Monopole Antenna for GSM/DCS Mobile Phone Application**
F.-S. Chang, H.-T. Chen, H.-C. Teng, *Military Academy of ROC, Taiwan;* W.-K. Su, *National Defense University, Taiwan*
- 11:00 98.4 **Built-in Half Size of Folded Dipole Antenna for Handsets**
S. Hayashida, T. Tanaka, H. Morishita, *National Defense Academy, Japan;* Y. Koyanagi, *Panasonic Mobile Communications Co., Ltd, Japan;* K. Fujimoto, *FAIS, University of Tsukuba, Japan*
- 11:20 98.5 **Printed Microstrip-Line-Fed Slot Antenna for Bluetooth and WLAN Applications**
J.-Y. Jan, J.-W. Su, *National Kaohsiung University of Applied Sciences, Taiwan;* W.-S. Chen, Y.-T. Cheng, *Cheng Shiu University, Taiwan*
- 11:40 98.6 **A 2.4-GHz Printed Meander-Line Antenna for WLAN Applications**
H.-R. Chunag, C.-C. Lin, S.-W. Kuo, *University Road, Taiwan*
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Session 99. Circuit Applications of Integral Equations

Wednesday, June 23 10:00-12:00

AP

Cottonwood

- Co-Chairs: Vikram Jandhyala, *University of Washington, USA*
Minqing Liu, *Cadence Design Systems, Inc., USA*
- 10:00 99.1 **Surface-Based Broadband Electromagnetic-Circuit Simulation of Lossy Conducting Structures in Microelectronic Circuits**
S. Chakraborty, V. Jandhyala, *University of Washington, USA*
- 10:20 99.2 **Mixed Electromagnetic and Circuit Simulations Using a Higher-Order Hybrid Formulation**
N. J. Champagne, J. D. Rockway, *Lawrence Livermore National Laboratory, USA;* V. Jandhyala, *University of Washington, USA*
- 10:40 99.3 **Efficient Analysis of On-chip Spiral Inductor with High-Order and Trapezoidal Rooftoop Basis Function**
M. Liu, *Cadence Design Systems, Inc, USA;* T. Yu, *Sigrity Inc., USA;* W. W. W. -M. Dai, *University of California, Santa Cruz, USA*

- 11:00 99.4 **Fast Computation of Dyadic Green's Function for Layered Media and Its Application in Interconnect Simulations**
E. Simsek, Q. H. Liu, *Duke University, USA*
- 11:20 99.5 **Novel Technique for Deembeding S-parameters in Electromagnetic Modeling of Arbitrary Circuits**
B. B. Janic, *WIPL-D Ltd., Serbia*; B. M. Kolundzija, *University of Belgrade, Serbia*; M. Rakic, *Imtel, Serbia*
- 11:40 99.6 **On the Accuracy of the Plane Wave Expansion of Green's Function for MMIC**
L. Li, Y. Zhang, Y.-J. Xie, C.-H. Liang, *XiDian University, China*

Session 100. Smart Antennas, Arrays, and Techniques

Wednesday, June 23 13:25-17:30

AP

San Carlos I

Co-Chairs: Constantine Balanis, *Arizona State University, USA*
Todd Nuteson, *Aerospace Corporation, USA*

- 13:25 Opening Remarks
- 13:30 100.1 **Bandwidth Limitations of Phase-Conjugate Arrays Used for Multipath Focusing**
B. E. Henty, D. D. Stancil, *Carnegie Mellon University, USA*
- 13:50 100.2 **Uniform Circular Arrays for Smart Antennas**
P. Ioannides, C. A. Balanis, *Arizona State University, USA*
- 14:10 100.3 **Integration and Measurements of an UMTS Smart Antenna**
M. Sierra Perez, M. Calvo, L. de Haro, R. Martinez, L. Garcia, A. Martinez, J. Garcia-Madrid, J. L. Masa, J. M. Serna, *Universidad Politécnica de Madrid, Spain*
- 14:30 100.4 **Smart Antenna Systems for Wireless Applications**
T. W. Nuteson, G. S. Mitchell, J. S. Clark, D. S. Haque, *The Aerospace Corp., USA*
- 14:50 100.5 **A Microstrip Array of Aperture-Coupled Patches for UMTS Base Stations**
P. Nepa, G. Manara, A. A. Serra, *University of Pisa, Italy*; S. Cioci, G. Tribellini, *Marconi Selenia Communications, Italy*
- 15:10 100.6 **Pattern Synthesis of Uniform Circular Array with Directive Elements**
C. A. Suarez-Fajardo, *Universidad Distrital, Colombia*; M. Ferrando-Bataller, A. valero-Nogueira, *Universidad Politecnica de Valencia, Spain*
- 15:30 100.7 **Compensation for the Mutual Coupling Effect in EPSRIT DOA Estimations**
T. T. Zhang, H. T. Hui, *Nanyang Technological University, Singapore*
- 15:50 100.8 **Improve Spectral Resolution of Subspace-Based DOA Estimation Algorithms Using Conventional Beamforming by Noise Subspace Projection**
H. Jin¹, C. J. Wen², L. Zhong¹
¹*Nanjing University of Science & Technology., China*; ²*Nanjing Research Institute of Electronics Technology, China*
- 16:10 100.9 **A Super-Resolution DOA Estimation Method for Low SNR and Small-Sized Arrays**
F.-X. Ge, D. Shen, V. O. K. Li, *The University of Hong Kong, China*
- 16:30 100.10 **Optimizing Uplink Beam Pattern of Smart Antenna by Phase-Amplitude Disturbancein in a Linear Array**
C.-H. Hsu, *Chien Kuo Institute of Technology, Taiwan*
- 16:50 100.11 **The Study of Different Kinds of MBA**
D.-C. Chang, *Da Yeh University, Taiwan*
- 17:10 100.12 **Development of a Simulation Tool for Analysis and Design of Smart Antenna Arrays**
R. M. Shubair, A. Merri, *Etisalat College of Engineering, UAE*

Session 101. MEMS and Periodic Structures

Wednesday, June 23 13:25-17:30

AP/URSI D

San Carlos II

Co-Chairs: John Volakis, *The Ohio State University, USA*
Abbas Omar, *University of Magdeburg, Germany*

- 13:25 Opening Remarks
- 13:30 101.1 **A Proposed SP3T Wideband RF MEMS Switch**
E. K. I. Hamad¹, G. E. Nadim², A. S. Omar¹
¹Otto-von-Gerulicke University Magdeburg, Germany; ²Cairo University - Fayoum Branch, Egypt
- 13:50 101.2 **Numerical Modeling of MEMS Structures Involving Motion Effected by the Coupling of Maxwell's and Mechanical Equations**
K. Kawano, T. Mori, M. Kuroda, Tokyo University of Technology, Japan; M. M. Tentzeris, Georgia Institute of Technology, USA
- 14:10 101.3 **A Preconditioner for Hybrid Matrices Arising in RF MEMS Switch Analysis**
Z. Wang¹, B. Jensen¹, J. Volakis^{1,2}, K. Saitou¹, K. Kurabayashi¹
¹University of Michigan, USA; ²The Ohio State University, USA
- 14:30 101.4 **A Millimeter-Wave CPW-Fed Twin Slot / Infrared Dipole Antenna Coupled Ni-NiO-Ni Diode**
M. R. AbdelRahman, G. D. Boreman, CREOL-School of Optics/UCF, USA
- 14:50 101.5 **A New Model for Distributed MEMS Transmission Lines**
K. Topalli, M. Unlu, H. Sagkol, S. Demir, O. Aydin Civi, S. Koc, T. Akin, Middle East Technical University, Turkey
- 15:10 101.6 **Integrated Passive Circuit Design for RF Switch-Filter Module**
X. Yang¹, T. X. Wu¹, R. Mahbub^{1,2}, D. Whiteman², B. Leonard², A. Gu²
¹University of Central Florida, USA; ²Sawtek, Inc., USA
- 15:30 101.7 **Analysis of Critical Manufacturing Tolerances on Millimeter-Waves Transitions**
T. Cavanna¹, E. Franzese², E. Limiti³, G. Pelosi², S. Selleri², A. Suriani¹
¹Alenia Spazio, Italy; ²University of Florence, Italy; ³University of Rome, Italy
- 15:50 101.8 **FDTD Modeling of Transmission Through Sub-Wavelength Apertures**
K. Caputa, M. A. Stuchly, University of Victoria, Canada
- 16:10 101.9 **Active Phase Shifter Module for Satellite Communications at Ka-Band**
J. M. Lee, J. H. Bae, N. S. Sung, C. S. Pyo, ETRI, Korea
- 16:30 101.10 **A New Design Procedure of Tapped Coupled-Line Filters**
K. W. Kim, C.-H. Park, S.-J. Han, Kyungpook National University, Korea
- 16:50 101.11 **A DC~32GHz 2-Bit Mems Phase Shifter**
L. Jianzhong^{1,2}, Z. Zhengping³, Y. Ruixia¹, L. Miao³, H. Xiaodong³
¹Hebei university of technology, China; ²Hebei university, China; ³Hebei Semiconductor Research Institute, China

Session 102. 30 Years of NEC

Wednesday, June 23 13:25-17:10

AP: Special Session

San Carlos III

Organizers: John W. Rockway, SPAWAR SYSCEN, USA
Richard W. Adler, Naval Postgraduate School, USA

Co-Chairs: John W. Rockway, SPAWAR SYSCEN, USA
Richard W. Adler, Naval Postgraduate School, USA

- 13:25 Opening Remarks
- 13:30 102.1 **The Numerical Electromagnetics Code (NEC) – A Brief History**
G. J. Burke¹, E. K. Miller², A. J. Poggio¹
¹Lawrence Livermore National Laboratory, USA; ²Los Alamos National Laboratory, USA

- 13:50 102.2 **Numerical Modeling for Direction Finding Applications**
K. Lysiak, Southwest Research Institute, USA
- 14:10 102.3 **Coast Guard Applications of NEC**
M. E. McKaughan, United States Coast Guard Academy, USA
- 14:30 102.4 **Navy Advances in NEC Applications**
J. C. Logan, J. W. Rockway, SPAWAR Systems Center - San Diego, USA
- 14:50 102.5 **Electromagnetic Visualisation for Communications Training**
A. Nott, Antuition Enterprises, Australia
- 15:10 102.6 **On Validation of NEC-MoM: a Useful Tool for MF Antenna System Design**
J. S. Belrose, Communications Research Centre Canada Canada, Canada; S. C. White, TVNZ(Australia) Pty LTD, Australia
- 15:30 102.7 **Design of Quadrifilar Helical Antenna for Use on Small Satellites**
P. Rezaei, M. Hakkak, Tarbiat Modares University & Iran Telecommunication Research Center, Iran
- 15:50 102.8 **A 7-Turn Multi-Step Quadrifilar Helix Antenna Providing High Phase Center Stability and Low Angle Multipath Rejection for GPS Applications**
S. R. Best, AFRL/SNHA, USA
- 16:10 102.9 **An Investigation into the Properties and Limits of Quasi-Taper Helical Antennas**
W. E. Jennings, A. R. Clark, University of the Witwatersrand, South Africa
- 16:30 102.10 **A Novel Element and Feed Configuration for a Dipole Very Closely Spaced to a PEC Ground Plane**
S. R. Best, AFRL/SNHA, USA
- 16:50 102.11 **The Other NEC (BSC) an Asymptotic Complement**
R. J. Marhefka, The Ohio State University, USA

Session 103. UWB Antenna & Feed Designs

Wednesday, June 23 13:25-17:30

AP

San Carlos IV

Co-Chairs: J. Scott Tyo, *University of New Mexico, USA*
Steven Dvorak, *University of Arizona, USA*

- 13:25 Opening Remarks
- 13:30 103.1 **A Generalized Crossed Dipole Antenna, the Fourtear Antenna**
S.-Y. Suh¹, W. Stutzman², W. Davis², A. Walther¹, J. Schiffer¹
¹*Intel Corporation, USA;* ²*Virginia Tech, USA*
- 13:50 103.2 **A Novel CPW-Fed Disc Antenna**
S.-Y. Suh¹, W. Stutzman², W. Davis², A. Walther¹, J. Schiffer¹
¹*Intel Corporation, USA;* ²*Virginia Tech, USA*
- 14:10 103.3 **Design of a Ultra Broadband and Wide Scan Radiator for a Dual-Polarized 6:1 Frequency Band Array**
H. K. Oh, B. T. Peng, *DSO National Laboratories, Singapore;* K. K. Chan, *Chan Technologies Inc., Canada*
- 14:30 103.4 **Analysis and Design of Broadband Planar Antenna**
Y. Okano, *Musashi Institute of Technology, Japan*
- 14:50 103.5 **Development of UWB, Dual-Polarized Dielectric Horn Antenna (DHA) for UWB Applications**
K.-H. Lee, C.-C. Chen, R. Lee, *The Ohio State University, USA*
- 15:10 103.6 **Differential and Single Ended Elliptical Antennas for 3.1-10.6 GHz Ultra Wideband**
J. D. Powell, A. P. Chandrakasan, *Massachusetts Institute of Technology, USA*
- 15:30 103.7 **An Ultra-Wideband Dual, Stacked, U-Slot Microstrip Antenna**
V. Natarajan, E. A. Chettiar, D. Chatterjee, *University of Missouri Kansas City (UMKC), USA*
- 15:50 103.8 **A Compact Tapered-Slot-Fed Annular Slot Antenna for Ultra-Wideband Applications**
T.-G. Ma, S.-K. Jeng, *National Taiwan University, Taiwan*
- 16:10 103.9 **CPW-Fed Planar Ultra-Wideband Antenna with Hexagonal Radiating Elements**
D.-H. Kwon, Y. Kim, *Samsung Advanced Institute of Technology, Korea*
- 16:30 103.10 **Coplanar Waveguide-Fed Dual Exponentially Tapered Slot Antenna for Ultra-Wideband Applications**
Y.-S. Lin, T.-G. Ma, S.-K. Jeng, C. H. Chen, *Graduate Institute of Communication Engineering, Taiwan*

- 16:50 103.11 Frequency Domain Measurement of the Reflector Impulse Radiating Antenna (IRA)
M. Manteghi, Y. Rahmat-Samii, K. Bahadori, *UCLA, USA*
- 17:10 103.12 A Novel UWB Feeding Mechanism for Reflector IRA and TEM Horn Antenna
M. Manteghi, Y. Rahmat-Samii, *UCLA, USA*

Session 104. Propagation in Caves and Tunnels

Wednesday, June 23 13:25-16:50

AP

Ferrante III

Co-Chairs: Donald Dudley, *University of Arizona, USA*
Kendall Casey, *SRI International, USA*

- 13:25 Opening Remarks
- 13:30 104.1 On Modal Propagation of High Frequency Electromagnetic Waves in Straight and Curved Tunnels
S. F. Mahmoud, *Kuwait University, Kuwait*
- 13:50 104.2 Propagation in a Rectangular Tunnel with Two Lossy Walls
D. G. Dudley, *University of Arizona, USA*
- 14:10 104.3 Dual Antenna Array Systems in Tunnels: Propagation Channel Properties
M. Lienard, *P. Degauque*, *University of Lille, France*
- 14:30 104.4 Probability Density Function for the Waves Propagating in a Straight Rough Wall Tunnel
H.-Y. Pao, *Lawrence Livermore National Laboratory, USA*
- 14:50 104.5 Fields in a Rough-Walled Circular Tunnel Excited by a Ring Source: Surface-Impedance Formulation
K. F. Casey, *SRI International, USA*
- 15:10 104.6 Waves and Fields inside a Borehole
W. C. Chew, *University of Illinois at Urbana-Champaign, USA*
- 15:30 104.7 Propagation in Circular Tunnels: Ring Source Excitation
D. G. Dudley, *University of Arizona, USA*
- 15:50 104.8 Experimental Mode Content Analysis Technique for Complex Overmoded Waveguide Systems
A. G. Cepni, D. D. Stancil, *Carnegie Mellon University, USA*; D. Brodtkorb, *ABB Corporate Research, Norway*
- 16:10 104.9 Characteristics of Radio Propagation Channels in Tunnel Environments: a Statistical Analysis
H. Kwon, Y. Kim, B. Lee, *Kyunghee Univ., Korea*
- 16:30 104.10 Time-Domain Target Detection Using a Double-sided Broadband Antenna
Y. Chen, Z. Xie, G. Shi, W. T. Joines, Q. H. Liu, L. Carin, *Duke University, USA*

Session 105. Reflector Antennas for Space and Ground Applications

Wednesday, June 23 13:25-17:30

AP

Ferrante II

Co-Chairs: Sudhakar Rao, *Lockheed Martin, USA*
William Imbriale, *Jet Propulsion Laboratory, USA*

- 13:25 Opening Remarks
- 13:30 105.1 Ultra Scanning Geostationary Orbiting Radar: An Array Compensated Spherical Reflector Antenna
K. Bahadori, Y. Rahmat-Samii, *University of California, Los Angeles, USA*
- 13:50 105.2 The Solar Probe Antenna
W. A. Imbriale, J. E. Randolph, *JPL, USA*; E. Embuido, *Composite Optics, Inc., USA*
- 14:10 105.3 Design of a Multiband Antenna for Satellite Communications on the Move
S. D. Targonski, *MIT Lincoln Laboratory, USA*
- 14:30 105.4 Study of Cluster of Hard Horns Feeding an Offset Multi-Beam Reflector Antenna for Dual Band Operation at 20/30 GHz
T. Lindgren, O. Sotoudeh, P.-S. Kildal, *Chalmers University of Technology, Sweden*

- 14:50 105.5 **Near Field Nulling with a Cylindrical Reflector and Moving Plates**
R. L. Haupt, *Penn State University, USA*; N. Malik, *Texas A & M University, USA*
- 15:10 105.6 **A Comparative Study of Mechanical Scanning Methods for Cassegrain Anrennas**
O. Graham, *ATK Missile Systems Company, USA*
- 15:30 105.7 **Ka-band Multiple-Beam Antennas for Gateways link of satellite mission**
A. Lasserre, P. Lepeltier, *ALCATEL SPACE, France*; C. Mangenot, *ESA, The Netherlands*
- 15:50 105.8 **Effect of Periodic and Aperiodic Surface Distortions on Membrane Reflector Antennas**
K. Bahadori, Y. Rahmat-Samii, *University of California, Los Angeles, USA*
- 16:10 105.9 **A Novel Low-Profile Log-Periodic Ultra Wideband Feed for the Dual-Reflector Antenna of US-SKA**
R. Olsson, P.-S. Kildal, *Chalmers University of Technology, Sweden*; S. Weinreb, *California Institute of Technology, California*
- 16:30 105.10 **A Compact Single-Horn C/X Dual Band and Circular Polarized Tx & Rx Antenna System**
P. Sarasa, A. Baussois, P. Regnier, *ALCATEL SPACE, France*
- 16:50 105.11 **Phased Array Fed Reflector Antennas with Interpolation Network for Next Generation Mobile Satellite Communication Systems**
Y. Suzuki, Y. Imaizumi, J. Mitsugi, M. Ueba, *NTT Network Innovation Laboratory, Japan*
- 17:10 105.12 **Evaluation of Degradation of Shaped Radiation Pattern Caused by Excitation Coefficient Error for Onboard Array-fed Reflector Antenna**
S. Nakazawa, S. Tanaka, T. Murata, *NHK Science and Technical Research Laboratories, Japan*

Session 106. Design and Optimization of Radiating Systems

Wednesday, June 23 13:25-17:30

AP/URSI B

Ferrante I

Co-Chairs: Tadashi Takano, *Institute of Space & Astronautical Science, JAXA, Japan*
Hao Ling, *University of Texas, USA*

- 13:25 Opening Remarks
- 13:30 106.1 **Genetic Optimization of Monopole Antenna Loaded with Shielded Loads**
M. D. Lockard, C. M. Butler, *Clemson University, USA*
- 13:50 106.2 **Optimization of Performance of Top-Hat Monopole Antennas by Adding Material Loading**
M. R. Zunoubi, H. A. Kalhor, *State University of New York - New Paltz, USA*
- 14:10 106.3 **A Modified Goubau-Type Antenna with Two Octaves of Impedance Bandwidth**
L. Cobos, H. D. Foltz, *University of Texas - Pan American, USA*; J. S. McLean, *TDK Corporation, USA*
- 14:30 106.4 **A Bandwidth-Enhanced PIFA for Space Application**
P. W. Fink, G. Y. Lin, J. A. Dobbins, A. W. Chu, L. W. Abbott, S. E. Fredrickson, *NASA Johnson Space Center, USA*
- 14:50 106.5 **Increasing Polarization Bandwidth for Single-Layer, Circularly-Polarized Microstrip Patch Antennas Incorporating Size Reduction Techniques**
R. M. Christopher, B. H. Uhl, R. P. Jedlicka, *New Mexico State University, USA*
- 15:10 106.6 **Ultra-Low-Profile Dipole Antenna in a Quadrupole Mode**
T. Takano, *ISAS of JAXA, Japan*; A. Thumvichit, *University of Tokyo, Japan*
- 15:30 106.7 **Broadband Printed Quadrifilar Helix Antenna**
Y. Letestu, A. Sharaiha, S. Collardey, *Institut d'Electronique et de Télécommunications de Rennes, France*
- 15:50 106.8 **Design of Tag Antennas for RFID Using a Pareto Genetic Algorithm**
H. Choo, C. Cho, *Hongik University, Korea*; H. Ling, *University of Texas at Austin, USA*
- 16:10 106.9 **Genetic Algorithms for the Optimization of Dual Frequency Profiled Corrugated Circular Horns**
L. Lucci¹, R. Nesti², G. Pelosi¹, S. Selleri¹, M. Tornielli¹
¹*University of Florence, Italy*; ²*Arcetri Astrophysical Observatory National Institute for Astrophysics, Italy*
- 16:30 106.10 **Integrated Antenna/Solar Array Cell (IA/SAC) System for Flexible Access Communications**
R. Q. Lee, E. B. Clark, A. T. Pal, D. M. Wilt, *NASA Glenn Research Center, USA*; C. H. Mueller, *Analex Corporation, USA*
- 16:50 106.11 **ULA Factorization Theorem**
H. Miyashita, S. Makino, *Mitsubishi Electric Corporation, Japan*

17:10 106.12 **An Optimum Method for Designing the Quadrifilar Helix Antenna**
P. Rezaei, Tarbiat Modarres University & Iran Telecommunication Research Center, Iran

Session 107. Through Wall Microwave Sensing and Imaging

Wednesday, June 23 13:25-17:30

AP/URSI B: Joint Special Session

Colton

Organizers: Ahmad Hoofar, *Villanova University, USA*
Nader Engheta, *University of Pennsylvania, USA*

Co-Chairs: Ahmad Hoofar, *Villanova University, USA*
Nader Engheta, *University of Pennsylvania, USA*

- 13:25 Opening Remarks
- 13:30 107.1 **Ultrawideband Radar Methods and Techniques of Through Barrier Imaging**
J. Chang, S. Azevedo, D. Chambers, P. Haugen, R. Leach, C. Paulson, C. Romero, A. Spiridon, M. Vigars, J. Zumstein, Lawrence Livermore National Laboratory, USA
- 13:50 107.2 **Through-the-Wall Wideband Synthetic Aperture Beamformer**
F. Ahmad, M. G. Amin, Villanova University, USA; S. A. Kassam, University of Pennsylvania, USA
- 14:10 107.3 **Through Wall Imaging at Microwave Frequencies Using Space-Time Focusing**
F. Aryanfar, K. Sarabandi, University of Michigan, USA
- 14:30 107.4 **Timed Arrays and Their Application to Impulse SAR for "Through-the-Wall" Imaging**
J. Z. Tatoian, G. Franceschetti, Eureka Aerospace, USA; D. V. Giri, Pro-Tech, USA; G. G. Gibbs, MARCORSYSCOM, USA
- 14:50 107.5 **Reduced Complexity Multi-frequency Imaging Using Active Aperture Synthesis**
Y. Guo, S. Kassam, Univ. of Pennsylvania, USA; F. Ahmad, M. Amin, Villanova University, USA
- 15:10 107.6 **Broadband Counter-Wound Spiral Antenna for Subsurface Radar Applications**
T. Y. Lim, DSO National Laboratories, Singapore; D. C. Jenn, Naval Postgraduate School, USA; W. T. Wollny, Quick Reaction Corporation, USA
- 15:30 107.7 **UWB Applications for Through-Wall Detection**
A. M. Attiya, A. Bayram, A. Safaai-Jazi, S. M. Riad, Virginia Polytechnic Institute and State University, USA
- 15:50 107.8 **Joint Doppler and Polarization Characterization of Moving Targets**
Y. Zhang, M. G. Amin, Villanova University, USA
- 16:10 107.9 **Echo Cancellation Using the Homomorphic Deconvolution**
T. K. Sarkar, W. Choi, Syracuse University, USA
- 16:30 107.10 **Image Formation Through Walls Using a Distributed Radar Sensor Network**
A. R. Hunt, AKELA, Inc., USA
- 16:50 107.11 **Effects of Wall Parameters and Standing Waves Between Walls in Through-Wall-Imaging Applications**
N. Bliznyuk, N. Engheta, University of Pennsylvania, USA; A. Hoofar, Villanova University, USA
- 17:10 107.12 **Through-Wall and Wall Microwave Tomography Imaging**
A. A. Vertiy, S. P. Gavrilov, V. N. Stepanyuk, I. V. Voynovskyy, TUBITAK-MRC, Turkey

Session 108. Low - Profile, Multi-band Antennas

Wednesday, June 23 13:25-17:30

AP

DeAnza III

Co-Chairs: Warren L. Stutzman, *Virginia Polytechnic Institute and State University, USA*
Nemai C. Karmakar, *Nanyang Technological University, Singapore*

- 13:25 Opening Remarks
- 13:30 108.1 **Design of a Dual and Wide Band Aperture Stacked Antenna with Double-Sided Notches**
K. Oh, B. Kim, J. Choi, *Hanyang University, Korea*
- 13:50 108.2 **A Dual Band 2.4/5.2GHz Antenna Including a Radial Line Slot Array and a Patch**
K. Bialkowski, S. Zagriatski, *The University of Queensland, Australia*
- 14:10 108.3 **A Novel Printed G-Shaped Monopole Antenna for Dual-Band WLAN Applications**
C. Y. Pan, C. H. Huang, T. S. Horng, *National Sun Yat-Sen University, Taiwan*
- 14:30 108.4 **Multi-Standard Patch Antenna Based on Stepped Impedance Microstrip**
S. Avrillon, Y. Mahe, A. Chousseaud, S. Toutain, *IREENA Laboratory, France*
- 14:50 108.5 **L and S Shape PIFA Antenna for Triple-Band (DCS/PCS/UMTS) Mobile Handset**
O. A. Saraereh, M. Jayawardene, P. McEvoy, J. C. Vardaxoglou, *Loughborough University, UK*
- 15:10 108.6 **Dual-Band PIFA Design for Mobile Phones Using H-Type Slits**
Y.-H. Lee, *Kumoh National Institute of Technology, Korea*; W.-H. Kwon, *Anyang University, Korea*
- 15:30 108.7 **Dual-Band Chip Antenna Using LTCC Multilayer Technology for Mobile Communication Applications**
K. Young-Do, K. Myoung-seok, K. Ho-Yong, L. Hong-min, *Kyonggi University, Korea*
- 15:50 108.8 **Miniaturized Dual-Band Hilbert Slot Antenna for Wireless Application**
A. T. M. Sayem, M. Ali, *University of South Carolina, USA*; H. S. Hwang, *Sony Ericsson Mobile Communications, USA*
- 16:10 108.9 **Design of a Miniaturized Dual Band Planar Inverted F Antenna**
S. Schulteis, C. Waldschmidt, C. Kuhnert, W. Wiesbeck, *Institut fuer Hoechstfrequenztechnik und Elektronik, Germany*
- 16:30 108.10 **A Compact Hilbert Planar Inverted-F Antenna (PIFA) for Dual-Band Mobile Phone Applications**
M. Z. Azad, M. Ali, *University of South Carolina, USA*
- 16:50 108.11 **A Dual-Band Inverted-L-Folded-Antenna with a Parasitic Wire**
K. Oh, K. Hirasawa, *University of Tsukuba, Japan*
- 17:10 108.12 **An Efficient Dual Frequency Antenna Feed**
R. B. Dybdal, D. E. Ping, *The Aerospace Corporation, USA*

Session 109. Metamaterials II

Wednesday, June 23 13:25-17:30

AP/URSI B: Joint Special Session

DeAnza II

Organizers: Nader Engheta, *University of Pennsylvania, USA*
Richard Ziolkowski, *University of Arizona, USA*

Co-Chairs: Nader Engheta, *University of Pennsylvania, USA*
Richard Ziolkowski, *University of Arizona, USA*

- 13:25 Opening Remarks
- 13:30 109.1 **Spectral FDTD: A Novel Computational Technique for the Analysis of Periodic Structures**
A. Aminian, Y. Rahmat-Samii, *University of California, Los Angeles, USA*
- 13:50 109.2 **Is Periodicity Required for Negative Index Materials?**
J. Xiong, R. Janaswamy, *Univ. of Massachusetts, Amherst, USA*
- 14:10 109.3 **Backward-Wave Materials: How to Realize and How to Use Them**
S. Maslovski, C. Simovski, S. Tretyakov, *Helsinki University of Technology, Finland*
- 14:30 109.4 **Dispersion Analysis of Resonance Cone Behaviour in Magnetically Anisotropic Transmission-Line Metamaterials**
A. K. Iyer, K. G. Balmain, G. V. Eleftheriades, *University of Toronto, Canada*
- 14:50 109.5 **Design of a Miniature Broadband SATCOM Antenna Using Textured Dielectric Loading via Topology Optimization**
G. Kiziltas, J. L. Volakis, *Ohio State University, USA*; N. Kikuchi, J. Halloran, *University of Michigan, USA*
- 15:10 109.6 **Existence and Properties of Microwave Surface Plasmons at the Interface Between a RH and LH Media**
C. Caloz¹, C.-J. Lee¹, D. R. Smith², J. B. Pendry³, T. Itoh¹

¹*University of California, Los Angeles, California;* ²*University of California, San Diego, California;* ³*Imperial College, UK*

- 15:30 109.7 **FDTD Simulation of 3-D Surface Plasmon Polariton Band Gap Waveguide Structures**
M. Lu, M. Lu, P. S. Carney, E. Michielssen, *University of Illinois at Urbana-Champaign, USA*
- 15:50 109.8 **A Novel Algorithm for Analysis of Surface Plasmon Polaritons in Metallic Thin Films**
C. Trampel, G. Kobidze, B. Shanker, D. P. Nyquist, *Michigan State University, USA*
- 16:10 109.9 **Metamaterial Bilayers for Enhancement of Wave Transmission Through a Small Hole in a Flat Perfectly Conducting Screen**
A. Alu¹, N. Engheta², L. Vigni¹
¹*University of Roma Tre, Italy;* ²*University of Pennsylvania, USA*
- 16:30 109.10 **Enhanced Transmission Through Coaxial Apertures Perforated in Thick Metallic Films**
V. Lomakin, S. Li, E. Michielssen, *University of Illinois at Urbana Champaign, USA*
- 16:50 109.11 **Interaction between Plasmonic and Non-Plasmonic Nanospheres and Their Equivalent Nano-Circuit Elements**
N. Engheta, N. Bliznyuk, *University of Pennsylvania, USA;* A. Alu, *Universita di Roma Tre, Italy*
- 17:10 109.12 **Generalized Surface Plasmon Resonance Sensor Using Metamaterials and Negative Index Medium**
A. Ishimaru, S. Jaruwatanadilok, Y. Kuga, *University of Washington, USA*

Session 110. Automotive, Hand-Held & Adaptive Antennas for Mobile Communication

Wednesday, June 23 13:25-17:30

AP

DeAnza I

Co-Chairs: Hui P. Hsu, *HRL Laboratories LLC, USA*
Hyok Song, *HRL Laboratories LLC, USA*

- 13:25 Opening Remarks
- 13:30 110.1 **Modeling Signal Strength Range of TPMS in Automobiles**
H. J. Song, H. P. Hsu, *HRL Laboratories, LLC, USA;* R. Wiese, T. Talty, *General Motors Corporation, USA*
- 13:50 110.2 **Modelling Automotive Antennas**
L. Low, R. J. Langley, *University of Kent, UK*
- 14:10 110.3 **One-Element Diversity Antenna with Reactance-Switching Circuit for Mobile Phones**
Y. Nishioka, T. Fukasawa, M. Ohtsuka, S. Makino, Y. Sunahara, *Mitsubishi Electric Corporation, Japan;* S. Urasaki, *Hiroshima Institute of Technology, Japan*
- 14:30 110.4 **Changes of Electric Fields and Radiation Patterns Depending on Cabin Antenna Positions**
N. Nakakura, Y. Yamada, *National Defense Academy, Japan*
- 14:50 110.5 **Bluetooth Antenna Implementation on an Attachment Module**
S. Ooi, *Motorola Inc, USA*
- 15:10 110.6 **A Top-Loaded, Inductively-Coupled Small Antenna for HF Ground Wave Transmission**
S. Lim¹, H. Choo², R. L. Rogers¹, H. Ling¹
¹*The University of Texas, USA;* ²*Hongik University, Korea*
- 15:30 110.7 **Feasibility Study of Adaptive Array Antenna on Handset for 4G Mobile Communications**
A. Hirata, S. Mitsuzono, T. Shiozawa, *Osaka University, Japan*
- 15:50 110.8 **Analysis of the Mobile Terminal Adaptive Array Antenna in Consideration of a Case and Elements**
K. Imamura, H. Morishita, *National Defence Academy, Japan*
- 16:10 110.9 **Characteristics of Polarization Diversity Bi-directional Antenna in Expressway Environment**
P. Keowsawat¹, K. Meksamoot², C. Phongcharoenpanich¹, S. Kosulvit¹, M. Krairiksh¹
¹*King Mongkuts Institute of Technology Ladkrabang, Thailand;* ²*Alan Dick(Thailand) Co., Ltd., Thailand*
- 16:30 110.10 **An Adaptive Impedance Matching System for Mobile Communication Antennas**
I. Ida, J.-I. Takada, *Tokyo Institute of Technology, Japan;* T. Toda, Y. Oishi, *Fujitsu Limited, Japan*
- 16:50 110.11 **Improved Convergence Property of Adaptive Array in Mobile Environment**
M. Fujimoto, T. Hori, *Fukui University, Japan*
- 17:10 110.12 **Switched Parasitic Antennas and Controlled Reactance Parasitic Antennas: a Systems Comparison**
D. V. Thiel, *Radio Science Laboratory, Australia*

Session 111. Diverse Antenna Applications

Wednesday, June 23 13:25-15:30

AP

Bonsai I

Co-Chairs: Brian Lail, *University of Central Florida, USA*
Bratin Ghosh, *Royal Military College of Canada, Canada*

- 13:25 Opening Remarks
- 13:30 111.1 **Fast Switching Antenna Diversity a Means for Biterror-Reduction with Mobile Satellite Digital Broadcast Reception**
*H. K. Lindenmeier, L. M. Reiter, J. F. Hopf, Institute for High Frequency Techniques, Germany;
H. G. Schuering, Fuba Automotive GmbH, Germany*
- 13:50 111.2 **Generalized Transmission-Line Model for Myelinated Nerve Fiber**
L. M. Livshitz, P. D. Einziger, M. Dolgin, J. Mizrahi, Technion Israel Institute of Technology, Israel
- 14:10 111.3 **Analysis and Design of Printed-Circuit Laterally-Shielded Leaky-Wave Antennas with High-Gain Substrate-Superstrate Configuration**
J. L. Gomez-Tornero, A. de la Torre, A. Alvarez-Melcon, Technical University of Cartagena, Spain
- 14:30 111.4 **CPW Fed Leaky Wave Antenna Using Resonance Gain**
B. Ghosh, Y. M. M. Antar, Royal Military College of Canada, Canada; S. F. Mahmoud, Kuwait University, Kuwait; A. Petosa, A. Ittipiboon, Communications Research Centre Canada, Canada
- 14:50 111.5 **Estimation of Exposure Zone Boundary Distances from Far-Field Antenna Characteristics for Finite Radius Wire Antenna Arrays**
H. Ebersbach, D. V. Thiel, Griffith University, Australia; M. Leckenby, iCOMMS Pty Ltd, Australia
- 15:10 111.6 **A Study on Loop Antenna with Uniform Current Distribution**
T. Minemura, T. Amano, T. Morooka, Toshiba, Japan

Session 112. Array Beamforming and Tracking

Wednesday, June 23 13:25-15:30

AP/URSI B

Bonsai II

Chair: Robert B. Dybdal, *The Aerospace Corp., USA*

- 13:25 Opening Remarks
- 13:30 112.1 **Design of Satellite Launcher Antenna for Efficient Link Budget**
Y. Shin, B. Lee, Wireless Technology Lab., Kyunghee Univ., Korea; J. Lee, Korea Aerospace Research Institute, Korea
- 13:50 112.2 **Digital Antenna Architectures Using Commercial off-the-Shelf Hardware**
*D. C. Jenn¹, L. Esswein², M. Melich¹, R. Johnson¹, C. S. Eng³, N. Willis¹, J. Alter⁴
¹Naval Postgraduate School, USA; ²U. S. Navy, USA; ³Ministry of Defence, Singapore; ⁴Naval Research Laboratory, USA*
- 14:10 112.3 **A New Very High Resolution Interference Rejection Method for Arrays**
J. Minkoff, ITT Aerospace Communications Division, USA
- 14:30 112.4 **A Space-Time Beam-Space ML Algorithm for Low-Angle Tracking**
C. Jianwen, Nanjing Research Institute of Electronics Technology, China; C. Hui, Wuhan Radar Academy, China
- 14:50 112.5 **Polarization Limitations in Antenna Tracking**
R. B. Dybdal, The Aerospace Corporation, USA
- 15:10 112.6 **Main Beam Alignment Verification**
R. B. Dybdal, D. D. Pidhayny, The Aerospace Corporation, USA

Session 113. Analysis and Evaluation of Numerical Techniques

Wednesday, June 23 13:25-15:30

URSI B

Bonsai III

Co-Chairs: Giuseppe Vecchi, *Politecnico di Torino, Italy*
Roberto Graglia, *Politecnico di Torino, Italy*

- 13:25 Opening Remarks
- 13:30 113.1 **A Numerical Investigation into the Accuracy of FE-BI and MoM for Canonical Structures**
M. M. Botha, T. Rylander, J.-M. Jin, *University of Illinois at Urbana-Champaign, USA*
- 13:50 113.2 **Error Analysis of Moment Method Solutions for 3D Scattering Problems**
C. P. Davis, K. F. Warnick, *Brigham Young University, USA*
- 14:10 113.3 **Singular Higher Order Models of Surface Integral Problems**
R. D. Graglia, G. Lombardi, *Politecnico di Torino, Italy*; D. R. Wilton, *University of Houston, USA*
- 14:30 113.4 **On the Degrees of Freedom in the Synthetic Functions Analysis of Large Antenna and Scatterers**
L. Matekovits, V. A. Laza, G. Vecchi, *Politecnico di Torino, Italy*
- 14:50 113.5 **A Comparison of Two Partial Differential Equation Techniques for Determining the Electromagnetic Scattering by Bodies of Revolution**
R. K. Gordon, E. Hutchcraft, *University of Mississippi, USA*
- 15:10 113.6 **Higher-Order Expansions for Iterative Current-Based Hybrid Methods**
E. Jorgensen, *TICRA, Denmark*; P. Meincke, O. Breinbjerg, *Technical University of Denmark, Denmark*

Session 114. Transients: Studies and Systems

Wednesday, June 23 13:25-15:30

URSI B

Redwood

Co-Chairs: E.K. Miller, *Los Alamos National Laboratory (retired), USA*
Le-Wei Li, *National University of Singapore, Singapore*

- 13:25 Opening Remarks
- 13:30 114.1 **Experimental Study of the Transient Field Reflected from a Layered Material**
B. T. Perry, E. J. Rothwell, *Michigan State University, USA*; G. J. Stenholm, *Air Force Research Laboratory, USA*
- 13:50 114.2 **E-pulse Discrimination of R-Cards in a Layered Environment**
E. J. Rothwell, L. C. Kempel, *Michigan State University, USA*
- 14:10 114.3 **Prediction of Package and Chip Substrate Loss Effects in Microelectronic Circuits Using Time-Domain Surface-Integral Equations**
C. Yang, V. Jandhyala, *University of Washington, USA*
- 14:30 114.4 **Transmission and Reception by UWB Antennas in Time Domain**
T. K. Sarkar, D. Ghosh, *Syracuse University, USA*
- 14:50 114.5 **Transient Responses of Short-Pulse Signals in Scattering**
T. K. Sarkar, M. Yuan, *Syracuse University, USA*
- 15:10 114.6 **Using the Laguerre Polynomials as Temporal Basis Function to Solve the Time Domain Magnetic Field Integral Equation**
T. K. Sarkar, Z. Ji, *Syracuse University, USA*; B. Jung, *Hoseo University, Korea*; M. Salazar-Palma, *Politecnico University of Madrid, Spain*

Session 115. Slotted Waveguide Arrays

Wednesday, June 23 13:25-15:30

AP

Ironwood

Co-Chairs: Gerald Aguirre, *Kyocera Inc., USA*
Atef Elsherbeni, *University of Mississippi, USA*

- 13:25 Opening Remarks
- 13:30 115.1 **Alternating-Phase Fed Single-Layer Slotted Waveguide Arrays for Grating Lobe Suppression**
Y. Kimura, R. Shimizu, M. Haneishi, *Saitama University, Japan*
- 13:50 115.2 **On the Design of Slotted Waveguide Planar Arrays**
A. Morini, T. Rozzi, G. Venanzoni, *Università Politecnica delle Marche, Italy*
- 14:10 115.3 **Design of Slotted Waveguide Arrays with Arbitrary Complex Slot Voltage Distribution**
R. Vincenti Gatti, L. Marcaccioli, R. Sorrentino, *University of Perugia, Italy*
- 14:30 115.4 **An Efficient Evaluation of Slot Admittance for Design of Non-resonant Waveguide Edge Slot Array**
K. J. Han, J. Park, H.-K. Na, *System R&D Center, LG Innotek Co., Ltd., Korea*; C. H. Kim, M. S. Chung, *Agency for Defence Development, Korea*
- 14:50 115.5 **Cavity-Backed Planar Slot Array Antenna with a Single Waveguide-Fed Sub-array**
K. Jung¹, H.-Y. Lee¹, G.-C. Kang¹, S. Han², B. Lee¹
¹*Kwangwoon University, Korea*; ²*INTOPS Co., Ltd., Korea*
- 15:10 115.6 **Effect of Tolerances on Sidelobe Levels in Slotted Waveguide Arrays**
D. R. Jahagirdar, *Reearch Center Imarat, India*

Session 116. CEM for Mixed Signal IC and RF Package Design

Wednesday, June 23 13:25-17:30

AP: Special Session

Cottonwood

Organizers: Henning Braunisch, *Intel Corporation, USA*
Kaladhar Radhakrishnan, *Intel Corporation, USA*

Co-Chairs: Henning Braunisch, *Intel Corporation, USA*
Kaladhar Radhakrishnan, *Intel Corporation, USA*

- 13:25 Opening Remarks
- 13:30 116.1 **Electromagnetic Modeling and Electromagnetic-Circuit Co-Simulation of Mixed-Signal Systems-on-Chip**
V. Jandhyala¹, P. Nikitin¹, J. D. Rockway², J. W. Rockway³, N. Champagne², R. Sharpe², D. White², R. Shi¹, D. Allstot¹
¹*University of Washington, USA*; ²*Lawrence Livermore National Laboratory, USA*; ³*Space and Naval Warfare Systems Center, USA*
- 13:50 116.2 **Mixing Electromagnetic and Electrical Circuit Simulations**
W. C. Chew¹, Y. H. Chu¹, L. J. Jiang¹, I. Jiang¹, Y. C. Pan², J. S. Zhao¹
¹*University of Illinois at Urbana-Champaign, USA*; ²*Intel, USA*
- 14:10 116.3 **Mixed Electromagnetic And Electrical Circuit Simulation For RFIC Characterization**
Z. Cendes, *Ansoft Corporation, USA*; A. Yen, *UMC, USA*
- 14:30 116.4 **Numerical Techniques for Extracting Geometrically Parameterized Reduced Order Interconnect Models from Full-wave Electromagnetic Analysis**
L. Daniel, J. White, *MIT, USA*
- 14:50 116.5 **Some Novel Techniques for Fast Simulation of Mixed-Signal IC and RF Package Design**
J. Yeo, S. Kwon, R. Mittra, *The Pennsylvania State University, USA*
- 15:10 116.6 **Efficient Full-Wave Simulation of High-Speed Printed Circuit Boards and Electronic Packages**
J. E. Bracken, S. Polstyanko, S. Raman, Z. J. Cendes, *Ansoft Corp., USA*
- 15:30 116.7 **Full-Wave Analysis of Microstrip Line Coupling and Fast Solution of Multi-Via Scattering in PCBs**
X. Gu¹, L. Tsang^{1,2}, H. Chen³, C.-C. Huang⁴, Q. Li¹, C.-J. Ong¹, K. L. Lai²

¹*University of Washington, USA*; ²*City University of Hong Kong, China*; ³*Micron Technology, Inc., USA*; ⁴*Intel Corporation, USA*

- 15:50 116.8 **A Parallel Time-Domain Adaptive Integral Method Based Hybrid Field-Circuit Simulator**
A. E. Yilmaz, J.-M. Jin, E. Michielssen, *University of Illinois at Urbana Champaign, USA*
- 16:10 116.9 **Development of a Novel Full-Wave 3D-Solver for the Analysis of MMIC and Optical Integrated Circuits**
L. Pierantoni, M. Farina, C. Ciandrini, A. Massaro, C. Santantonni, T. Rozzi, *Università Politecnica delle Marche, Italy*
- 16:30 116.10 **Computational Electromagnetics for High-Frequency IC Design**
D. Jiao, C. Dai, S.-W. Lee, T. R. Arabi, G. Taylor, *Intel Corporation, USA*
- 16:50 116.11 **A Rigorous Approach to Lumped Element Circuit Models for Monolithic Inductors**
R. G. Rojas, A. B. Buurma, *The Ohio State University, USA*; K. Idstein, *Northrop Grumman, USA*; G. Creech, *Air Force Research Laboratory, USA*
- 17:10 116.12 **Electromagnetic Modeling Methodologies and Design Challenges of Packages for 6.4-12.8 Gbps Chip-to-Chip Interconnects**
W. T. Beyene, H. Shi, J. Feng, C. Yuan, *Rambus, Inc., USA*

Session 117. Horns and Helical Antennas

Wednesday, June 23 15:30-17:10

AP

Bonsai I

Co-Chairs: Jeffrey Clark, *Virginia Polytechnic Institute and State University, USA*
Anthony Jennetti, *Northrup Grumman Mission Systems, USA*

- 15:30 117.1 **Helical Antenna for GPS Applications**
C.-W. Lan, T.-H. Chang, J.-F. Kiang, *National Taiwan University, Taiwan*
- 15:50 117.2 **Multifilar Hemispherical Helical Antennas**
J. Clark, A. Safaai-Jazi, *Virginia Polytechnic Institute and State University, USA*
- 16:10 117.3 **Wavy-Walled Taper Horns with Intentionally Controlled Radiation Pattern**
H. Deguchi, T. Okada, M. Tsuji, H. Shigesawa, *Doshisha University, Japan*
- 16:30 117.4 **A Novel Dual-Slot Structure Mode Converter for L/C Dual-Band Corrugated Horn**
D. Biao, Z. Wen-Jing, Y. Ke-Zhong, *Communication Telemetry and Telecontrol Research Institute, China*
- 16:50 117.5 **Antennas Made Simple: Making Antennas with Recycled Materials**
H. Martínez, J. M. González-Arbesú, S. Blanch, *Polytechnic University of Catalonia, Spain*

Session 118. Electromagnetic Education

Wednesday, June 23 15:30-17:30

AP

Bonsai II

Chair: Aziz Inan, *University of Portland, USA*

- 15:30 118.1 **Undergraduate Electromagnetics Education at Oklahoma State University: VECTOR (Vitalizing Electromagnetic Concepts To Obtain Relevancy)**
C. F. Bunting, R. A. Cheville, J. C. West, R. Bryant, *Oklahoma State University, USA*
- 15:50 118.2 **Using Mathematica in Microstrip Antenna Education**
I. Bianchi, R. Moreano, J. C. S. Lacava, *Instituto Tecnológico de Aeronáutica, Brazil*; L. Cividanes, *Instituto Nacional de Pesquisas Espaciais, Brazil*
- 16:10 118.3 **Educational Software based on the Finite Element Method for the Analysis of Scattering and Radiation Problems**
D. Sánchez-Repila¹, I. Gómez-Revuelto², L. E. García-Castillo¹
¹*Universidad de Alcalá, Spain*; ²*Universidad Politécnica de Madrid, Spain*
- 16:30 118.4 **Giving Life to Teaching Introductory Electromagnetics: a Three-Year Assessment Plan**
M. Popovic, D. Giannacopoulos, *McGill University, Canada*

- 16:50 118.5 **On the Use of Commercial FEM Electromagnetic Software in an Undergraduate Curriculum**
W. J. Chappell, A. K. Mills, *Purdue University, USA*
- 17:10 118.6 **On the Execution of Electromagnetic Field Courseware**
F.-W. Yao, S.-S. Zhong, *Shanghai University, China*

Session 119. Error Analysis of Numerical Methods

Wednesday, June 23 15:30-17:30

AP

Bonsai III

Co-Chairs: Karl Warnick, *Brigham Young University at Provo, Utah, USA*
Weng C. Chew, *University of Illinois at Urbana-Champaign, USA*

- 15:30 119.1 **Role of Numerical Noise in Ultra Large-Scale Computing**
W. C. Chew, *University of Illinois at Urbana-Champaign, USA*; M. L. Hastriter, *Air Force Institute of Technology, USA*
- 15:50 119.2 **The Physical Meaning of the Sobolev Norm in Error Estimation**
C. P. Davis, K. F. Warnick, *Brigham Young University, USA*
- 16:10 119.3 **Accurate Error Estimates in the Fast Multipole Method for Electromagnetics**
Q. Carayol, *Dassault Aviation, France*; F. Collino, *Cerfacs, France*
- 16:30 119.4 **A Simple Error Estimator for the Moment Method in Electromagnetic Scattering**
X. Wang, M. M. Botha, J.-M. Jin, *University of Illinois at Urbana-Champaign, USA*
- 16:50 119.5 **Improving the Accuracy of the MFIE with the Choice of Basis Functions**
O. Ergul, L. Gurel, *Bilkent University, Turkey*
- 17:10 119.6 **Investigation of the Inaccuracy of the MFIE Discretized with the RWG Basis Functions**
O. Ergul, L. Gurel, *Bilkent University, Turkey*

Session 120. Feeding Mechanism for Patch Antenna

Wednesday, June 23 15:30-17:30

AP

Ironwood

Co-Chairs: R.B. Waterhouse, *Pharad LLC, USA*
Allen Glisson, *University of Mississippi, USA*

- 15:30 120.1 **Coplanar Patch Antenna Fed at the Non-Radiating Edge**
S. G. Pandey, R. Ramadoss, *Auburn University, USA*
- 15:50 120.2 **Reducing Spurious Radiation in Edge-Fed Patch Antennas**
W. S. Rowe, *RMIT University, Australia*; R. B. Waterhouse, *Pharad, USA*
- 16:10 120.3 **Miniaturized Aperture-Coupled Microstrip Antennas**
Q. Rao, T. A. Denidni, *University of Quebec, Canada*; R. H. Johnston, *University of Calgary, Canada*
- 16:30 120.4 **A New Feeding Structure for Radial Line Planar Patch Antennas**
J. L. Masa Campos, M. Sierra Pérez, *Universidad Politécnica de Madrid, Spain*
- 16:50 120.5 **Millimeter Wave Microstrip Array Design with CRLH-TL as Feeding Line**
Z. Qi, Z. Zhongxiang, X. Shanjia, *University of Science & Technology of China, China*; D. Wenwu, *Tianjing University, China*
- 17:10 120.6 **Patch Antenna Syntheses - from Direct Feed to Broadband L-Probe to Bandwidth Controlled T-Square Feeds**
Y. L. Chow^{1,2}, M. W. K. Lee^{3,2}
¹*University of Waterloo, Canada*; ²*Interwave Technology Ltd., China*; ³*Chinese U of Hong Kong, China*

Session 121. Fractal Antennas

Thursday, June 24 7:55-12:00

AP

San Carlos I

Co-Chairs: Doug Werner, *Pennsylvania State University, USA*
José M. González-Arbesú, *Universitat Politècnica de Catalunya, Spain*

- 7:55 Opening Remarks
- 8:00 121.1 **Two-Element Multi-Band Fractal PIFA for MIMO Applications in Small Size Terminals**
J. Guterman, *Institute of Radioelectronics, Poland*; A. A. Moreira, C. Peixeiro, *Instituto de Telecomunicações, Portugal*
- 8:20 121.2 **Printed Plane-Filling Fractal Antennas for UHF Band**
X. Chen, *Digital Security Controls Ltd, Canada*; Y. Liu, S. Safavi-Naeini, *University of Waterloo, Canada*
- 8:40 121.3 **A Wire Model for the Sierpinski Gasket Type Monopole Antenna and a Truly Broadband Bent-Wire Antenna**
J. S. Belrose, *Communications Research Centre Canada, Canada*
- 9:00 121.4 **Fractal Multiband Antennas Using GA/MOM Optimized Log Periodic Dipole Arrays**
S. E. El-Khamy, *Alexandria University, Egypt*; M. A. Mangoud, M. A. Aboul-Dahab, A. I. Zaki, *Arab Academy for Science & Technology, Egypt*
- 9:20 121.5 **Characteristics of Fractal Dipole Antennas Integrated on Si for ULSI Wireless Interconnects**
K. Kimoto, S. Watanabe, T. Kikkawa, *Hiroshima University, Japan*; P. S. Hall, *University of Birmingham, UK*; Y. Yuan, *City University of Hong Kong, China*
- 9:40 121.6 **Multi-Band Bowtie Antenna Based on Fractal Geometry**
R. Shavit, Y. Gelman, E. Ben-Ari, *Ben-Gurion University of the Negev, Israel*
- 10:00 121.7 **Development of a Cantor Fractal Array**
T. Canet, L. de-Haro, *Universidad Politécnica de Madrid, Spain*
- 10:20 121.8 **Some Pre-Fractal Self-Complementary Antennas**
J. M. González-Arbesú, J. M. Rius, J. Romeu, *Polytechnic University of Catalonia, Spain*
- 10:40 121.9 **Circularly Polarized Microstrip Fractal Antennas**
P. Dehkhoda, A. Tavakoli, *Amirkabir University of Technology, Iran*
- 11:00 121.10 **A New Version of Printed Sierpinski Multiband Fractal Antenna**
X. Li, X. X. Yin, T. J. Cui, W. Hong, *Southeast University, China*
- 11:20 121.11 **Efficient Full Kernel Calculation for Wire Antennas**
A. Heldring, J. M. Rius, *Universitat Politècnica de Catalunya, Spain*
- 11:40 121.12 **Conclusions of the Fractalcoms Project: Exploring the Limits of Fractal Electrodynamics for the Future Telecommunication Technologies**
J. M. Rius, J. M. González-Arbesú, J. Romeu, Á. Cardama, A. Heldring, E. Úbeda, *Polytechnic University of Catalonia, Spain*; J. R. Mosig, E. Cabot, *Federal Polytechnic Institute of Lausanne, Switzerland*; R. Gómez, A. Rubio, M. Fernández, *University of Granada, Spain*; M. Giona, P. Burghignoli, *'La Sapienza' University of Rome, Italy*; G. Bugeda, M. Riera, *International Center for Numerical Methods in Engineering, Spain*; J. Parrón, *Universitat Autònoma de Barcelona, Spain*

Session 122. Time Domain and Hybrid Finite Element Methods

Thursday, June 24 7:55-12:00

AP

San Carlos II

Co-Chairs: Jin-Fa Li, *The Ohio State University, USA*
Zoltan Cendes, *Ansoft Corporation, USA*

- 7:55 Opening Remarks
- 8:00 122.1 **Application of Novel High Order Time Domain Vector Finite Element Method to Photonic Band-Gap Waveguides**
R. N. Rieben¹, D. A. White², G. H. Rodrigue¹
¹U.C. Davis, USA; ²Lawrence Livermore National Laboratory, USA

- 8:20 122.2 **Perfectly Matched Layers in Three Dimensions for the Time-Domain Finite Element Method**
T. Rylander, J.-M. Jin, University of Illinois at Urbana-Champaign, USA
- 8:40 122.3 **Stability and Accuracy of Coaxial Waveguide Port Algorithm for the Time-Domain Finite Element Method**
T. Rylander, J.-M. Jin, University of Illinois at Urbana-Champaign, USA
- 9:00 122.4 **On Stable Subcell Modeling in Time-Domain Finite-Element Simulations**
F. Edelvik, T. Weiland, Technische Universität Darmstadt, TEMF, Germany
- 9:20 122.5 **Anisotropic-Medium PML for FETD with Conjugate-Scaled Basis Functions**
S. Wang, General Electric Medical Systems, USA; R. Lee, F. L. Teixeira, ElectroScience Lab., USA
- 9:40 122.6 **First Order Models for Thin-Material Sheets and Coatings in the Finite-Element Time-Domain Method**
D. J. Riley, N. W. Riley, Northrop Grumman Corporation, USA
- 10:00 122.7 **A Stationary FE-BI Formulation for 3D Electromagnetic Analysis**
M. M. Botha, J.-M. Jin, University of Illinois at Urbana-Champaign, USA
- 10:20 122.8 **A Posteriori Error Indicators for 3D Electromagnetic FE-BI Analysis**
M. M. Botha, J.-M. Jin, University of Illinois at Urbana-Champaign, USA
- 10:40 122.9 **Domain Decomposition Method for Large Finite Antenna Arrays**
S.-C. Lee, M. N. Vouvakis, J.-F. Lee, The Ohio State University, USA
- 11:00 122.10 **Higher-Order Finite Element Analysis of Finite-by-Infinite Arrays**
Z. Lou, J.-M. Jin, University of Illinois at Urbana-Champaign, USA
- 11:20 122.11 **A Novel 3D Hybrid FEM High-Frequency Technique for the Analysis of Scattering Problems**
I. Gómez-Revuelto¹, L. E. García-Castillo², F. Saéz-de-Adana², L. D. Haro¹, M. Salazar-Palma¹
¹Universidad Politécnica de Madrid, Spain; ²Universidad de Alcalá, Spain
- 11:40 122.12 **A Comparative Study of Infinite Elements for Two-Dimensional Electromagnetic Scattering Analysis**
J.-K. Byun, J.-M. Jin, University of Illinois at Urbana-Champaign, USA

Session 123. Integrated & Conformal Antennas

Thursday, June 24 7:55-10:00

AP

San Carlos III

Co-Chairs: Marek Bialkowski, *University of Queensland, Australia*
Tatsuo Itoh, *University of California Los Angeles, USA*

- 7:55 Opening Remarks
- 8:00 123.1 **A Wideband Triangular Shaped Patch Antenna with Folded Shorting Wall**
Y. Li, K. M. Luk, City University of Hong Kong, China; R. Chair, K. F. Lee, University of Mississippi, USA
- 8:20 123.2 **Hooked Loop Antenna Concept for Bluetooth Headset Applications**
H. Jidhage, A. Stjernman, Ericsson AB, Sweden
- 8:40 123.3 **Modelling the Distortions to Manufacture Spherical Conformal Microstrip Antennas**
B. R. Piper, M. E. Bialkowski, University of Queensland, Australia
- 9:00 123.4 **Design of Compact Dual-Band Microstrip Patch Antenna for GPS/K-PCS Operation**
H.-Y. Kim, Y.-A. Lee, C.-H. Won, H.-M. Lee, Kyonggi University, Korea
- 9:20 123.5 **Active Integrated Antenna Based Rectenna Using the Circular Sector Antenna with Harmonic Rejection**
S.-M. Han, J.-Y. Park, T. Itoh, UCLA, USA
- 9:40 123.6 **The Ground Effect on a Bended C-Patch Antenna Strip**
M.-C. M. Liang, National University of KaoHsiung, Taiwan; S.-T. Lin, S.-A. Yang, I-Shou University, Taiwan

Session 124. EBG/PBG - Based Waveguiding Structures and Artificial Media

Thursday, June 24 7:55-12:00

AP/URSI B: Joint Special Session

San Carlos IV

Organizers: Raj Mittra, *Pennsylvania State University, USA*
Karu Esselle, *Macquarie University, Australia*

Co-Chairs: Raj Mittra, *Pennsylvania State University, USA*
Karu Esselle, *Macquarie University, Australia*

- 7:55 Opening Remarks
- 8:00 124.1 **Is the 3D-Wire Medium Isotropic?**
M. G. Silveirinha, *Instituto de Telecomunicações - Universidade de Coimbra, Portugal*; C. A. Fernandes,
Instituto de Telecomunicações - Instituto Superior Técnico, Portugal
- 8:20 124.2 **Electromagnetic Bandgap Structures in Planar Technology**
F. Falcone¹, F. Martin², J. Bonache², T. Lopetegi¹, M. A. Gomez-Laso¹, J. Garcia², N. Gil², M. Sorolla¹
¹*Universidad Pública de Navarra, Spain*; ²*Universitat Autònoma de Barcelona, Spain*
- 8:40 124.3 **Unusual Propagation Characteristics in CRLH Structures**
C. Caloz, C. Allen, T. Itoh, *University of California, Los Angeles, California*
- 9:00 124.4 **A Double Layer EBG Structure for Slot-Line Printed Devices**
N. Boisbouvier^{1,2}, A. Louzir¹, F. Le Bolzer¹, A.-C. Tarot², K. Mahdjoubi²
¹*Corporate Research, France*; ²*IETR, France*
- 9:20 124.5 **Performance Optimization of Microwave Filters Using Photonic Band Gap (PBG) Structures**
A. S. Mohan, H. M. Chiu, T. Huang, *University of Technology, Sydney, Australia*
- 9:40 124.6 **Spurious Harmonics Suppression of Tapered SIR Band-Pass Filter Using Electromagnetic Bandgap (EBG) Structure**
N. C. Karmakar, *Nanyang Technological University, Singapore*; S. K. Padhi, *CSIRO, Australia*
- 10:00 124.7 **Simple and Accurate Circuit Models for High-Impedance Surfaces Embedded in Printed Circuit Boards**
S. Shahparnia, O. M. Ramahi, *University of Maryland, USA*
- 10:20 124.8 **High-Impedance Surfaces Embedded in Printed Circuit Boards: Design Considerations and Novel Applications**
S. Shahparnia, O. M. Ramahi, *University of Maryland, USA*
- 10:40 124.9 **Study of the Influence of the Field Incidence Direction on Finite PBG Structure**
B. Delhom, E. Richalot, S. Mengue, O. Picon, *ESYCOM Université de Marne La Vallée, France*
- 11:00 124.10 **Electromagnetic Band-Gap Structures for Multiband Mitigation of Resonant Modes in Parallel-Plate Waveguides**
T. Kamgaing^{1,2}, O. M. Ramahi²
¹*Motorola Inc., USA*; ²*University of Maryland, USA*
- 11:20 124.11 **A Novel Hybrid Defected Ground Structure as Low Pass Filter**
M. N. Mollah, N. C. Karmakar, *Nanyang Technological University, Singapore*
- 11:40 124.12 **Advanced Methods to Improve Compactness in EBG Design and Utilization**
L. Yang, Z. Feng, *Tsinghua University, China*

Session 125. User Interactions with Communications Antennas

Thursday, June 24 7:55-10:00

AP

Ferrante III

Chair: Mohammad Ali, *University of South Carolina, USA*

- 7:55 Opening Remarks
- 8:00 125.1 **A Flexible Wearable Antenna**
C. Cibin, P. Leuchtmann, M. Gimersky, R. Vahldieck, *Swiss Federal Institute of Technology (ETH), Switzerland*;
S. Moscibroda, *Swiss Defense Procurement Agency, Switzerland*
- 8:20 125.2 **A Theoretical and Experimental Study of Dielectrically Loaded Antennas and their Contribution Towards Low-SAR**
M. Kitra, P. McEvoy, J. C. Vardaxoglou, J. R. James, *Loughborough University, UK*
- 8:40 125.3 **Mass-Averaged SAR Measurement in the SAR Estimation System Using Flat-Plane Solid Phantom**
T. Iyama, T. Onishi, S. Uebayashi, *NTT DoCoMo, Inc., Japan*; T. Nojima, *Hokkaido University, Japan*
- 9:00 125.4 **Temperature Increase in the Human Head Due to Different Models of Cellular Phones**
H.-Y. Chen, H.-P. Yang, *Yuan Ze University, Taiwan*

- 9:20 125.5 **PCS Antenna with the User Interaction and Far Field Pattern Evaluation**
R. S. Zaridze, G. N. Ghvedashvili, K. N. Tavzarashvili, L. S. Shoshiashvili, G. G. Kajaia, Tbilisi State University, Georgia
- 9:40 125.6 **Horizontally Polarized Omni-Directional Antennas for PHS**
H. Kawakami, T. Haga, D. Shirahama, Antenna Giken Co.,Ltd., Japan

Session 126. Formula/Modeling Techniques for Antenna Design

Thursday, June 24 7:55-10:00

AP

Ferrante II

Co-Chairs: Steven Best, *Air Force Research Laboratory/SNHA Hanscom AFB, USA*
Jovan Lebaric, *Naval Postgraduate School, USA*

- 7:55 Opening Remarks
- 8:00 126.1 **Transmission Line Model Design Formula for Microstrip Antennas with Slots**
V. Zahou¹, G. Mayridis¹, C. G. Christodoulou², M. T. Chryssomallis¹
¹Democritus University of Thrace, Greece; ²The University of New Mexico, USA
- 8:20 126.2 **A New Basis Function for Compact Differential Lines**
Z. G. Qian, T. J. Cui, W. B. Lu, X. X. Yin, W. Hong, Southeast University, China
- 8:40 126.3 **New CAD Model for Cavity-Backed Circular Microstrip Antenna**
D. Guha, M. Biswas, J. Y. Siddiqui, University of Calcutta, India
- 9:00 126.4 **An Improved Error Correction Method of TRL Removing Manufacturing Inaccuracy**
Y. Kim, KEES, Korea
- 9:20 126.5 **A Resonant Frequency Formula of Bow-Tie Antenna and Its Application**
W.-J. Chen, L. Bin-hong, X. Tao, Shanghai Jiaotong University, China
- 9:40 126.6 **A New MOM Model for Line-Fed Patch Antennas**
Z. G. Qian, T. J. Cui, W. B. Lu, X. X. Yin, W. Hong, Southeast University, China

Session 127. Propagation Modeling for New and Challenging Wireless Communications Environments

Thursday, June 24 7:55-12:00

AP/URSI B: Joint Special Session

Ferrante I

Organizers: Zhengqing Yun, *University of Hawaii, USA*
Magdy Iskander, *University of Hawaii, USA*

Co-Chairs: Zhengqing Yun, *University of Hawaii, USA*
Magdy Iskander, *University of Hawaii, USA*

- 7:55 Opening Remarks
- 8:00 127.1 **Progress in Modeling Challenging Propagation Environments**
Z. Yun, M. F. Iskander, University of Hawaii, USA
- 8:20 127.2 **Indoor Wireless Channel Modeling from 2.4 to 24GHz Using a Combined E/H-Plane 2D Ray Tracing Method**
D. Lu, D. Rutledge, California Institute of Technology, USA
- 8:40 127.3 **Efficient Ray-Tracing Techniques for Outdoors and Indoors Propagation Analysis**
F. Catedra, O. Gutierrez, I. Gonzalez, C. Delgado, F. Saez de Adana, Universidad de Alcala, Spain
- 9:00 127.4 **Wideband Mobile Propagation Measurements at 3.7 GHz in an Urban Environment**
J. W. Porter, I. Lisica, G. Buchwald, Motorola, USA

- 9:20 127.5 **Path Loss Correlation Between PCS and MMDS/ISM Bands in Suburban Morphology - An Empirical Model**
O. W. Ata, H. Garg, *Sprint PCS, USA*
- 9:40 127.6 **Experimental Verification of a 3-D Propagation Model Based on Fresnel-Kirchhoff Integral**
Y. Xu, Q. Tan, D. Erricolo, P. L. E. Uslenghi, *University of Illinois at Chicago, USA*
- 10:00 127.7 **Indoor Directional Channel Modelling for Future Wireless Communications**
Z. Tang, A. S. Mohan, *University of Technology, Sydney, Australia*
- 10:20 127.8 **Prediction Model for the Characteristics of Non-Specular Wave Scattered from Building Surface**
H. Budiarto, K. Haneda, J.-I. Takada, *Tokyo Institute of Technology, Japan*
- 10:40 127.9 **Spatial Channel Models for Multiple-Antenna Systems**
A. S. Y. Poon, *Intel Corporation, USA*; R. W. Brodersen, D. N. C. Tse, *Electrical Engineering and Computer Sciences, USA*
- 11:00 127.10 **Feasibility of Closed Loop Operation for MIMO Links with MIMO Interference**
M. F. Demirkol¹, M. A. Ingram², Z. Yun¹
¹*University of Hawaii, USA*; ²*Georgia Institute of Technology, USA*
- 11:20 127.11 **Stochastic Modeling and Simulation of Multiple-Input Multiple-Output Channels: A Unified Approach**
A. Abdi, *New Jersey Institute of Technology, USA*
- 11:40 127.12 **Fading Simulations in Channel Modeling Based on Fast Solutions of Maxwell Equations**
P. Xu^{1,2}, K. W. Lam¹, L. Tsang^{1,3}, K. L. Lai¹
¹*City University of Hong Kong, China*; ²*Wuhan University, China*; ³*University of Washington, USA*

Session 128. Signal Processing for Adaptive Antennas

Thursday, June 24 7:55-10:00

AP

Colton

Co-Chairs: Tapan Sarkar, *Syracuse University, USA*
Tayeb Denidni, *INRS-EMT University of Quebec, Canada*

- 7:55 Opening Remarks
- 8:00 128.1 **Coherence Signal Impact on the Performance of a Spatio-Temporal GSC Receiver for CDMA Applications**
K. Ghanem, T. A. Denidni, *INRS Energie Matériaux et Communications, Canada*
- 8:20 128.2 **Spatio-Frequential Filtering Considerations on Antenna Array**
S. Avrillon, Y. Mahe, A. Chousseaud, S. Toutain, *IREENA Laboratory, France*
- 8:40 128.3 **A New Method for Noise Subspace Estimation Based on the Spatial Smoothing Lanczos Algorithm**
L. Huang, *Xidian University, China*
- 9:00 128.4 **A New Skill Called Monotonous Reference Convergence Method Used to Accelerate the Iteration Convergence in a Multiple Interferences**
C.-H. Hsu, *Chien Kuo Institute of Technology, Taiwan*
- 9:20 128.5 **Spatial Fading Correlation Of Circular Antenna Arrays With Laplacian PAS In MIMO Channel**
X. Li, Z.-P. Nie, *University of Electronic Science and Technology of China, China*
- 9:40 128.6 **Analysis the De-Correlation Performance of Linear Prediction Algorithm**
C. Hui, *WuHan Radar Academy Key Research Lab, China*

Session 129. Wideband Patch & Slot Antennas

Thursday, June 24 7:55-12:00

AP

DeAnza III

Co-Chairs: Sedki Riad, *Virginia Polytechnic Institute and State University, USA*
Jeffrey Williams, *University of Houston, USA*

- 7:55 Opening Remarks
- 8:00 129.1 **New Geometry of Wideband Small-Sized Antenna: the Vertical Patch Antenna**
C. L. Mak, K. M. Luk, *City University of Hong Kong, China*; K. F. Lee, *The University of Mississippi, USA*
- 8:20 129.2 **A Novel Wideband Dual-Slot Antenna with Harmonic Suppression**
H. Kim, Y. J. Yoon, *Yonsei University, Korea*
- 8:40 129.3 **Comparison of Resonant Frequency Calculations for Wideband U-Slot Antennas on Microwave Substrates**
E. A. Chettiar, V. Natarajan, D. Chatterjee, *University of Missouri Kansas City (UMKC), USA*
- 9:00 129.4 **A Wideband CPW-Fed Patch Antenna With Defective Ground Plane**
X.-C. Lin, L.-T. Wang, *National Taipei University of Technology, Taiwan*
- 9:20 129.5 **Compact Wound-Type Slot Antenna with Wide Bandwidth**
J. Hwang, S. Jung, S. Kang, Y. Kim, *Electronics and Telecommunications Research Institute, Korea*
- 9:40 129.6 **Wideband Inverted Trapezoid Microstrip Patch Antenna Fed by Uneven I-Beam**
H. Elkamchouchi, Y. M. Madany, *Alexandria University, Egypt*
- 10:00 129.7 **A 42GHz Wideband Slot Antenna**
J. M. Lee¹, Y.-H. Cho², C. S. Pyo¹, I. G. Choi³
¹*ETRI, Korea*; ²*MokWon Uni., Korea*; ³*Chung Buk National Univ., Korea*
- 10:20 129.8 **Broadband Design of the Printed Triangular Slot Antenna**
W.-S. Chen, F.-M. Hsieh, *Southern Taiwan University of Technology, Taiwan*
- 10:40 129.9 **Broadband Bandwidth Enhancement of an Aperture-Coupled Microstrip Patch Antenna**
A. S. Slavova, A. A. Rahman, A. S. Omar, *University of Magdeburg, Germany*
- 11:00 129.10 **Wideband Microstrip Patch Antennas With V-Slot and Patch-Via Resonators**
G. Z. Rafi, L. Shafai, *University of Manitoba, Canada*
- 11:20 129.11 **Broadband Vertical Transitions at Millimeter-Wave Frequencies Using Microstrip-Fed Cavity Couplers**
E. S. Li¹, J.-C. Cheng², G.-Q. Huang¹
¹*National Chi Nan University, Taiwan*; ²*Chang-Gung University, Taiwan*
- 11:40 129.12 **Wide Band Dual Circularly Polarized Aperture Coupled Microstrip Patch Antenna with Bow Tie Shaped Apertures**
A. K. Sharma, R. Singh, A. Mittal, *Bharat Electronics Limited, India*

Session 130. Metamaterials Designs and Applications

Thursday, June 24 7:55-12:00

AP

DeAnza II

Co-Chairs: Hossein Mosallaei, *University of Michigan, USA*
Silvio Hrabar, *University of Zagreb, Croatia*

- 7:55 Opening Remarks
- 8:00 130.1 **Negative Index Metamaterial for Selective Angular Separation of Microwaves by Polarization**
J. S. Derov, B. Turchinetz, E. E. Crisman, A. J. Drehman, R. Wing, *Air Force Research Laboratory, USA*
- 8:20 130.2 **An experimental verification of Spatial Harmonics Effects on Negative Refraction**
S. Sudhakaran, Y. Hao, C. G. Parini, *Queen Mary, University of London, UK*
- 8:40 130.3 **Homogenisation of Negative Refractive Index Metamaterials: Comparison of Effective Parameters of Broadside-Coupled and Edge-Coupled Split-Ring Resonators**
D. Seetharamdoo, R. Sauleau, A.-C. Tarot, K. Mahdjoubi, *Institut d'Electronique et de Telecommunications de Rennes, France*
- 9:00 130.4 **Dispersion Characteristics of Dispersive Double Negative (DNG) Metamaterial Columns**
K. Y. Kim¹, J.-H. Lee², J. R. Sohn¹, H.-S. Tae¹
¹*Kyungpook National University, Korea*; ²*Hongik University, Korea*
- 9:20 130.5 **On the Homogenization of Bulk and Sheet Metamaterials**
M. G. Silveirinha, *Instituto de Telecomunicações - Universidade de Coimbra, Portugal*; C. A. Fernandes, *Instituto de Telecomunicações - Instituto Superior Técnico, Portugal*
- 9:40 130.6 **Metamaterial Configurations in Coplanar Waveguide**
F. Falcone¹, F. Martin², J. Bonache², J. Baena³, T. Lopetegi¹, M. A. Gomez Laso¹, J. Garcia², I. Gil², R. Marques³, M. Sorolla¹

¹*Universidad Publica de Navarra, Spain;* ²*Universitat Autonoma de Barcelona, Spain;* ³*Universidad de Sevilla, Spain*

- 10:00 130.7 **Effective Permittivity of a Medium with Stratified Dielectric Host and Metallic Inclusions**
M. G. Silveirinha, Instituto de Telecomunicações - Universidade de Coimbra, Portugal; C. A. Fernandes, Instituto de Telecomunicações - Instituto Superior Técnico, Portugal
- 10:20 130.8 **Analytical Modelling of Semi-Infinite Electromagnetic Crystal's Excitation by Plane Electromagnetic Wave**
P. A. Belov, C. R. Simovski, St. Petersburg State University of Information Technologies, Mechanics and Optics, Russia
- 10:40 130.9 **Efficient analysis of Finite Composite Arrays**
E. Ubeda, J. Romeu, J. M. Rius, Universitat Politècnica de Catalunya (UPC), Spain
- 11:00 130.10 **Nonreciprocal Metamaterials Based on Magnetic Photonic Crystals**
A. Figotin, I. Vitebskiy, University of California at Irvine, USA
- 11:20 130.11 **Design of Left-Handed Materials with Broad Bandwidth and Low Loss Using Double Resonant Frequency Structure**
*W. Xu¹, L.-W. Li^{1,2}, Q. Wu²
¹National University of Singapore, Singapore; ²Harbin Institute of Technology, China*
- 11:40 130.12 **Realization of Quasi Uniform Left-Handed Medium Based on LH Transmission Line**
Z. Qi, Z. Jun, X. Shanjia, University of Science & Technology of China, China; D. Wen-wu, Tianjing University, China

Session 131. Microstrip Antenna Miniaturization

Thursday, June 24 7:55-12:00

AP

DeAnza I

Co-Chairs: John Volakis, *The Ohio State University, USA*
Jeffrey Kula, *The Ohio State University, USA*

- 7:55 Opening Remarks
- 8:00 131.1 **Patch Antenna Miniaturization Using Thick Truncated Textured Ceramic Substrates**
*J. S. Kula¹, D. Psychoudakis², C.-C. Chen¹, J. Volakis¹, J. Halloran²
¹The Ohio State University, USA; ²University of Michigan, USA*
- 8:20 131.2 **Experimental Studies of Small Microstrip Antennas for GSM/DCS Applications**
C.-J. Wang, W.-T. Tsai, Feng Chia University, Taiwan
- 8:40 131.3 **A Very Low Profile CP EBG Antenna for RFID Reader**
P. Raumonen, M. Keskilammi, L. Sydänheimo, M. Kivikoski, Tampere University of Technology, Finland
- 9:00 131.4 **Shorted Rectangular Microstrip Antenna on Dielectric Chip for 5.2 GHz Wireless LAN**
*M. Taguchi¹, T. Okajima¹, H. Shimoda², K. Tanaka¹
¹Nagasaki University, Japan; ²TDK Corporation, Japan*
- 9:20 131.5 **Compact Design of Dual-Band Triangular Slot Antenna for Wireless Communication**
J.-W. Wu, J.-H. Lu, National Kaohsiung Institute of Marine Technology, Taiwan
- 9:40 131.6 **Compact Circular Microstrip Antenna for Conical Patterns**
C. B. Ravipati, Applied EM, USA
- 10:00 131.7 **Analysis and Design of Low Frequency Microstrip Antennas**
R. Araneo, S. Celozzi, University of Rome La Sapienza, Italy
- 10:20 131.8 **An Opened Quarter-Wave Patch Antenna with an L-Shape Probe Feed**
S.-L. S. Yang, K.-M. Luk, City University of Hong Kong, China
- 10:40 131.9 **Mesh Antennas with Reduced Size**
T.-H. Chang, C.-W. Lan, J.-F. Kiang, National Taiwan University, Taiwan
- 11:00 131.10 **Shorted Patches Mounted on High Impedance Ground Planes**
D. Pavlickovski, RMIT University, Australia; R. B. Waterhouse, Pharad, USA
- 11:20 131.11 **A Novel Reduced Size CPW-Coupled Patch Antenna Topology For Millimeter Waves Applications**
K. Hettak, Communications Research Centre, Canada; G. Y. Delisle, Univ. of Ottawa, Canada
- 11:40 131.12 **Small Wideband Patch Antenna with Double Shorting Walls**
C. Y. Chiu, C. H. Chan, K. M. Luk, City University of Hong Kong, China

Session 132. Remote Sensing of Earth's Surface & Atmosphere

Thursday, June 24 7:55-12:00

AP/URSI F

Bonsai I

Co-Chairs: Kultegin Aydin, *Pennsylvania State University, USA*
Kamal Sarabandi, *University of Michigan, USA*

- 7:55 Opening Remarks
- 8:00 132.1 **Bistatic Canopy Scattering Simulation Using Modified MIMICS**
P. Liang, L. Pierce, *The University of Michigan, USA*
- 8:20 132.2 **Multi-layer Bistatic MIMICS**
P. Liang, M. Moghaddam, L. Pierce, *The University of Michigan, USA*
- 8:40 132.3 **Near-Earth Wave Propagation Simulation in Presence of Vegetation Layer**
D. Liao, *The University of Michigan-Ann Arbor, USA*
- 9:00 132.4 **Simulation of Radar Scattering from Electrically Large Objects under Tree Canopies**
M. Dehmollaian, I.-S. Koh, K. Sarabandi, *University of Michigan, USA*
- 9:20 132.5 **A VHF/UHF Simulator for Soil Moisture Beneath Forest Canopies**
L. E. Pierce, M. Moghaddam, *University of Michigan, USA*; E. Rodriguez, P. Siqueira, *JPL, USA*
- 9:40 132.6 **Parabolic Equation Modelling of VHF Ground Radar Wave Inside Forest**
M. Le Palud, *CREC, France*
- 10:00 132.7 **95 GHz Polarimetric Radar Signatures of Pristine Crystals Mixed with Aggregates and Rimed Crystals**
K. Aydin, J. Singh, *Penn State University, USA*
- 10:20 132.8 **Three-Dimensional FDTD Modeling of the Response of the Global Earth-Ionosphere Waveguide to Seismically-Induced Sources**
J. J. Simpson, A. Taflove, *Northwestern University, USA*
- 10:40 132.9 **Investigation on Fading of High-Frequency Signals Propagating in the Ionosphere: from Both the Theoretical and Experimental Perspective**
K. S. B. Yau, *The University of Adelaide, Australia*
- 11:00 132.10 **Near Real-Time Ionospheric HF Propagation Modeling and Prediction**
L. Hong, B. A. Lail, L. Jones, *University of Central Florida, USA*
- 11:20 132.11 **Long-Term Observations of the 3-D Wind Field by Using CLOVAR VHF Wind-Profiler Radar**
R. G. Belu, *Wayne State University, USA*; W. K. Hocking, *The University of Western Ontario, Canada*
- 11:40 132.12 **DCT and DWT Based Image Compression in Remote Sensing Images**
I. Hacihaliloglu, *Istanbul Technical University Informatics Institute, Turkey*; M. Kartal, *Istanbul Technical University Enstitute of Science and Technology, Turkey*

Session 133. Commission E: EMI Topics

Thursday, June 24 7:55-12:00

AP/URSI E&B

Bonsai II

Co-Chairs: Radian Belu, *Wayne State University, USA*
Ross Speciale, *Research and Development, Inc., USA*

- 7:55 Opening Remarks
- 8:00 133.1 **A Simple Practical Model of Fields and Currents in Lightning Discharges**
R. G. Belu, *wayne state university, USA*; A. C. Belu, *the university of Western Ontario, Canada*
- 8:20 133.2 **Electromagnetic Topology Analysis: Small Apertures and Lightning Interactions**
P. Kirawanich, R. Gunda, N. Kranthi, N. E. Islam, *University of Missouri, USA*
- 8:40 133.3 **High Power Microwave Amplifiers with Toroidal/Helical Electron Orbits**
R. A. Speciale, *Research & Development Inc., USA*

- 9:00 133.4 **Effects of a Non-Standard Design of a Dielectric in a Blumlein-Configuration Parallel-Plate Pulse-Forming Line**
M. Joler, C. G. Christodoulou, E. Schamiloglu, J. Gaudet, *University of New Mexico, USA*
- 9:20 133.5 **Coupling to a Loaded Thin Wire in a Cylindrical/Coaxial Cavity**
C. L. Bopp III, C. M. Butler, F. M. Tesche, *Clemson University, USA*
- 9:40 133.6 **The Impact of Increasing Thickness on the Shielding Effectiveness of a Doubly-Periodic Conducting Screen Evaluated Using a Mode-Matching Technique**
E. J. Rothwell, D. C. Love, *Michigan State University, USA*
- 10:00 133.7 **Comparative Study of Microstrip and Stripline in the Split Reference Plane of High Speed Digital Circuit Application**
H.-Y. Shim, J. Kim, *Samsung Electronics, Korea*; J. G. Yook, *Yonsei University, Korea*
- 10:20 133.8 **Broadband over Power Line - Radiation and Propagation**
A. Paul, J. V. Williams, C.-W. Wang, J. C. Richards, T. Sullivan, G. F. Hurt, *National Telecommunications and Information Administration, U.S. Department of Commerce, USA*
- 10:40 133.9 **A Study on the Design of STL/TTL System Simulator for M/W Band Digital Broadcasting Relay System**
S. J. Kim, Y. S. Choi, *ETRI, Korea*
- 11:00 133.10 **The Analysis of Capacity Decrease by Calculating Statistically the Amount of Interference from IMT-2000 TDD to FDD System**
S. J. Kim, Y. S. Choi, *ETRI, Korea*
- 11:20 133.11 **Maximum Users per Unit Area of CDMA System for Evaluation of Spectrum Usage Efficiency**
J. Kim, *ETRI, Korea*
- 11:40 133.12 **Exploiting Noisy Transient Response Using the Fractional Fourier Transform**
T. K. Sarkar, S. Jang, *Syracuse University, USA*; C. Baum, *AFRL, USA*

Session 134. Integral Equation Formulations & Applications

Thursday, June 24 7:55-12:00

AP

Bonsai III

Co-Chairs: Michael Khayat, *NASA/Johnson Space Center, USA*
Juan Mosig, *EPFL Lausanne, Switzerland*

- 7:55 Opening Remarks
- 8:00 134.1 **Comparison of the Müller and PMWCHT Surface Integral Formulations for the Locally Corrected Nyström Method**
A. Zhu, S. D. Gedney, *University of Kentucky, USA*
- 8:20 134.2 **A Spectral Integral Method for Periodic and Nonperiodic**
J. Liu, Q. H. Liu, *Duke University, USA*
- 8:40 134.3 **Electromagnetic Scattering by Thin Dielectric Sheets Using Integral Equation Techniques**
M. A. Khayat, *NASA, USA*; D. R. Wilton, *University of Houston, USA*
- 9:00 134.4 **An Approximate Integral Equation for Thick Slots**
J. R. Mosig, *Swiss Federal Institute of Technology, Switzerland*
- 9:20 134.5 **Efficient Integral Equation Based Analysis of Scattering from PEC-Anisotropic Bodies**
G. Kobidze¹, K. Aygun², B. Shanker¹
¹*Michigan State University, USA*; ²*Intel Corporation, USA*
- 9:40 134.6 **Integral Equation Based Analysis of Transient Scattering from Surfaces with Impedance Boundary Condition**
Q. Chen, M. Lu, E. Michielssen, *University of Illinois at Urbana-Champaign, USA*
- 10:00 134.7 **Numerical Study of Surface Integral Formulations for Homogeneous Bodies**
T. W. Lloyd, J. Song, *Iowa State University, USA*; C. Lu, *University of Kentucky, USA*; G. Kang, *University of Utah, USA*
- 10:20 134.8 **Volume/Surface Integral Equation Analysis of Circular Patch Finite Antennas**
F. D. Quesada-Pereira, D. Cañete-Rebenaque, J. Pascual-Garcia, J. L. Gómez-Tornero, A. Álvarez-Melcón, *Technical University of Cartagena, Spain*

- 10:40 134.9 **Computer Simulation of Electromagnetic Radiation from Apertures in Infinite Screen by EFIE**
M. Tanaka, K. Tanaka, *Gifu University, Japan*
- 11:00 134.10 **Integral Equation Formulations for Modeling Electromagnetic scattering from Indented Screens**
Y. Xu, C.-F. Wang, Y.-B. Gan, F.-G. Hu, *Temasek Laboratories, National University of Singapore, Singapore*
- 11:20 134.11 **Application of Mixed Potential Integral Equation for Cylindrically Stratified Structure**
J. Sun¹, L.-W. Li¹, E.-P. Li², M.-S. Leong¹
¹*National University of Singapore, Singapore; ²Institute of High Performance Computing, Singapore*
- 11:40 134.12 **Numerical Analysis of Copper Sheet RF Antenna by Two-Dimensional Moment Method**
R. Lai, X. Jiang, *Tsinghua University, China*

Session 135. Electromagnetic Scattering Analysis and Effects

Thursday, June 24 7:55-12:00

URSI B

Ironwood

Co-Chairs: Danai Torrungrueng, *Asian University of Science and Technology, Thailand*
Agostino Monorchio, *University of Pisa, Italy*

- 7:55 Opening Remarks
- 8:00 135.1 **Statistics of Chaotic Impedance and Scattering Matrices**
T. M. Antonsen, X. Zheng, E. Ott, S. Hamady, S. Anlage, *University of Maryland, USA*
- 8:20 135.2 **Efficient Well-Log Data Inversion with Chaotic Optimization Algorithm**
J. C. Goswami¹, Z. Lu², D. Heliot¹
¹*Schlumberger Technology Corporation, USA; ²University of Houston, USA*
- 8:40 135.3 **Frequency Bistatic Analysis - A New Tool for Radar Cross Section Post-Treatment**
S. Vermersch, *CEA/CESTA, France*
- 9:00 135.4 **The Optical Theorem for Electromagnetic Scattering by a Three-Dimensional Scatterer in the Presence of a Lossless Halfspace**
D. Torrungrueng, *Asian University of Science and Technology, Thailand*; B. Uungan, J. T. Johnson, *The Ohio State University, USA*
- 9:20 135.5 **Comparison of Approximation Models and a Full-Wave Method for Microwave Scattering from Lossy Dielectric Elliptical Disks**
Y. Oh, *Hongik University, Korea*
- 9:40 135.6 **Testing the Validity of Impedance Boundary Conditions Applied to Periodic Structures**
H. A. Kalhor, M. R. Zunoubi, *State University of New York - New Paltz, USA*
- 10:00 135.7 **A Study of Vehicle Influences on the Performance of Automobile Antennas**
M.-Y. Lin, K.-H. Lin, *National Sun Yat-Sen University, Taiwan*
- 10:20 135.8 **Effect of Flight Cinematic on Helicopter Rotor Radar Signatures**
P. G. Pouliquen, J.-F. Damiens, *DGA/CELAR, France*
- 10:40 135.9 **EM Scattering of Many Plane Waves by a Conducting Sphere**
A. A. Helaly, *Sohar College of Education, Oman*
- 11:00 135.10 **Diffraction of a Plane Wave by a Screen Occupying a Plane Angular Sector**
B. V. Budaev, D. B. Bogy, *University of California at Berkeley, USA*
- 11:20 135.11 **Electromagnetic Field Scattering on a Transparent Transient 2D Cylinder.**
N. K. Sakhnenko, A. G. Nerukh, *Kharkov National University of Radio Electronics, Ukraine*
- 11:40 135.12 **Fields in the Presence of an Unclosed Irregular Structure**
E. K. Semenova, V. A. Doroshenko, *Kharkov National University of Radio Electronics, Ukraine*

Session 136. Inverse Scattering

Thursday, June 24 7:55-12:00

URSI B

Cottonwood

Co-Chairs: Gary Brown, *Virginia Polytechnic Institute and State University, USA*
Rene Marklein, *University of Kassel, Germany*

- 7:55 Opening Remarks
- 8:00 136.1 **Causality, Minimum Phase and Inverse Scattering**
M. A. Fiddy, *University of North Carolina, USA*
- 8:20 136.2 **A New Method for Landmine Detection Using Norton Surface Waves**
T. Dogaru, *US Army Research Laboratory, USA*; G. Brown, *Virginia Polytechnic Institute & State University, USA*
- 8:40 136.3 **Joint Electromagnetic/Acoustic Reconstruction of Underground Structures**
Q. H. Liu, F. Li, L.-P. Song, *Duke University, USA*
- 9:00 136.4 **2D Nonuniform Fast Fourier Transform (NUFFT) Method for Synthetic Aperture Radar and Ground Penetrating Radar**
J. Song, Q. H. Liu, *Duke University, USA*
- 9:20 136.5 **Hybrid Extended Born Approximation and Contrast Source Inversion for 3-D Inversion in Layered Media**
L.-P. Song, Q. H. Liu, F. Li, *Duke University, USA*
- 9:40 136.6 **Inversion of Scattering Properties of a Multilayer Subsurface with Rough Interfaces**
M. Moghaddam, C.-H. Kuo, L. Pierce, *University of Michigan, USA*
- 10:00 136.7 **Numerical Modeling and Inverse Scattering in Nondestructive Testing: Recent Applications and Advances**
R. Marklein, J. Miao, K. J. Langenberg, *University of Kassel, Germany*; V. Schmitz, *University of the Saarland, Germany*
- 10:20 136.8 **Non-Destructive Evaluation of Steel Fiber Reinforced Concrete Slabs**
A. Franchois^{1,2}, S. Van Damme¹, D. De Zutter¹, F. Olyslager¹, L. Taerwe¹
¹Ghent University, Belgium; ²IMEC, Belgium
- 10:40 136.9 **An Inversion Technique using the Genetic Algorithm for Retrieval of Soil Moisture and Surface Roughness from Multi-polarized Radar Observations of Bare Soil Surfaces**
Y. Oh, Hongik University, Korea
- 11:00 136.10 **Multistatic Microwave Imaging of Perfectly Conducting Objects**
C.-H. Tseng, T.-H. Chu, *National Taiwan University, Taiwan*
- 11:20 136.11 **A Novel Time-Domain Ultra-Wideband Microwave Imaging Radar System Design**
F.-C. Chen, *National Chiao Tung University, Taiwan*
- 11:40 136.12 **Shape Reconstruction of Three-Dimensional Conducting Patches Using Physical Optics, NURBS Geometric Modeling and the Genetic Algorithm**
A. Saeedfar, K. Barkeshli, *Sharif University of Technology, Iran*

Session 137. Active Antennas and Arrays

Thursday, June 24 10:00-12:00

AP

San Carlos III

Co-Chairs: Roberto Rojas, *The Ohio State University, USA*
Juraj Bartolic, *University of Zagreb, Croatia*

- 10:00 137.1 **Broadband Dual-Polarized Antenna for Active Array Applications**
S. Gao¹, R. Vahldieck², A. Sambell¹
¹University of Northumbria, UK; ²Swiss Federal Institute of Technology, Switzerland
- 10:20 137.2 **A Multi-scale Technique for the Electromagnetic Modeling of Active Antennas**
E. Perret, LEN7, France
- 10:40 137.3 **A Microstrip Patch Antenna Oscillator for Reflectarray Applications**
L. Boccia, G. Amendola, G. Di Massa, *University of Calabria, Italy*

- 11:00 137.4 **Impedance of Patch Antenna for Active Antenna's Structures**
D. V. Radulovic, A. Nesic, I. Radnovic, *Institute for Microwave Technique and Electronics, Serbia and Montenegro*
- 11:20 137.5 **Broadband Active Receiving Microstrip Antenna for DCS-UMTS**
D. Segovia-Vargas¹, V. González-Posadas², D. Castro-Galán¹, J. L. Vázquez-Roy¹, E. Rajo-Iglesias¹
¹*Universidad Carlos III de Madrid, Spain; ²Universidad Politécnica de Madrid, Spain*
- 11:40 137.6 **An Active Subharmonic Retrodirective Array Using Dual Polarized Microstrip Antennas**
P. Ulavapalli, M. A. Saed, *Texas Tech University, USA*

Session 138. Fast Numerical Techniques

Thursday, June 24 10:00-12:00

AP

Ferrante III

Chair: Steven Dvorak, *University of Arizona*

- 10:00 138.1 **A New Wideband Closed-Form Green's Function for a HED over Microstrip Structure**
A. Aminian, *University of California, Los Angeles, USA*; R. Faraji-Dana, N. Hojjat, *University of Tehran, Iran*
- 10:20 138.2 **A Generalized Fast Frequency Sweep Algorithm for Coupled Circuit-EM Simulations**
B. Fasenfest, *University of Houston, USA*; J. T. West, S. S. Chakraborty, V. Jandhyala, *University of Washington, USA*; J. D. Rockway, N. J. Champagne, *Lawrence Livermore National Laboratory, USA*
- 10:40 138.3 **A Padé via AWE Fast Frequency Sweep for Quasi-static Coupled Electromagnetic and Circuit Simulation**
T. West, V. Jandhyala, *University of Washington, USA*
- 11:00 138.4 **Computation of Sommerfeld Integrals via Rational Function Fitting**
V. I. Okhmatovski, *Neolinear, Inc., USA*; A. C. Cangellaris, *University of Illinois at U.-C., USA*
- 11:20 138.5 **An Efficient Computation of Impedances of Dipoles over Cylindrical Structure By Using a spectrum of 2D Solutions with Asymptotic Waveform Evaluation**
J. Yang, P.-S. Kildal, *Chalmers University of Technology, Sweden*
- 11:40 138.6 **A Fast Algorithm for Electrically Small Composite Objects**
Y. Chu, W. Chew, *University of Illinois at Urbana-Champaign, USA*

Session 139. Phased Array Elements & Components

Thursday, June 24 10:00-12:00

AP

Ferrante II

Co-Chairs: Hans Steyskal, *Royal Institute of Technology, Sweden*
Odell Graham, *ATK Missile Systems Co., USA*

- 10:00 139.1 **Low Cost Phase Shifters and Integrated Phased Antenna Arrays Designs Based on the Ferroelectric Materials Technology**
W. C. Kim, M. Iskander, *University of Hawaii, USA*; C. Tanaka, *Trex Enterprises Corporation, USA*
- 10:20 139.2 **Multi-Band Antenna Technology**
R. S. Tahim, *RST Scientific Research, Inc., USA*; J. Foshee, *Air Force Research Laboratory, USA*; K. Chang, *Texas A&M University, USA*
- 10:40 139.3 **X-Band RF MEMS Phase Shifters Suitable for Printed Phased Array Antennas**
A. Sundaram, R. Ramadoss, *Auburn University, USA*
- 11:00 139.4 **Spiral Element for Wide-Band Phased Arrays**
H. Steyskal, J. Ramprecht, *Royal Institute of Technology, Sweden*; H. Holter, *Saab Bofors Dynamics AB, Sweden*
- 11:20 139.5 **Series-Fed Beam-Scanning Array Antenna Comprising Multi-Stage Configured Microstrip Antenna with Tunable Reactance Devices and Open Stubs**
N. Honma, T. Seki, K. Nishikawa, K. Tsunekawa, *NTT Corporation, Japan*

- 11:40 139.6 **Broadening Beamwidth of E-Plane Radiation Pattern of a Dipole Antenna With Loaded Monopole Elements**
K. Nishizawa, H. Miyashita, S. Makino, *Mitsubishi Electric Corporation, Japan*; K. Sawaya, *Tohoku University, Japan*
-

Session 140. Digital Beam Forming Array Design

Thursday, June 24 10:00-12:00 AP Colton

Co-Chairs: Atef Elsherbeni, *University of Mississippi, USA*
Gerald Aguirre, *Kyocera Inc., USA*

- 10:00 140.1 **Circularly Polarised Digital Beam Forming Transmitting Array for Mobile Satellite Communications**
O. Litschke, S. Holzwarth, *IMST GmbH, Germany*; H. Pawlak, A. Molke, A. F. Jacob, *Technische Universität Braunschweig, Germany*
- 10:20 140.2 **Design of Multiband/Broadband Software-Defined Super-Sparse Digital Beam Forming Array for down-Link Satellite Communications**
J. J. Wang, R. A. Swistak, D. J. Triplett, C. J. Stevens, *Wang Electro-Opto Corporation, USA*
- 10:40 140.3 **Adaptive Beampattern Synthesis Based on Null Broadening**
Y. Yang, C. Wan, *Nanyang Technological University, Singapore*
- 11:00 140.4 **Implementation of a Digital Beamformer Module for a UMTS Smart Antenna**
L. García, F. J. Garcia-Madrid, A. Martínez, R. Martínez, M. Calvo, *Universidad Politécnica de Madrid, Spain*
- 11:20 140.5 **Ka-Band Multi-Beam Antenna**
S. Nakseon, *ETRI (Electronics and Telecommunications Research Institute), Korea*
- 11:40 140.6 **A Optimum Design of Beam Forming Module for Active Phased Array Antenna System**
Y.-B. Jung, W.-H. Park, S.-I. Jeon, C.-J. Kim, *ETRI, Korea*
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Session 141. Modeling of Printed and Patch Antennas

Thursday, June 24 13:25-15:30 AP San Carlos I

Co-Chairs: Guiping Zheng, *University of Mississippi, USA*
Gregory Manassero, *Northrup Grumman Mission Systems, USA*

- 13:25 Opening Remarks
- 13:30 141.1 **Efficient Magnetic Current Model for Analysis of LTCC Electrically Small Antennas at Ka Band**
M. Zhang, L.-W. Li, B.-L. Ooi, M. S. Leong, *National University of Singapore, Singapore*
- 13:50 141.2 **A Patch Antenna with a Top Dielectric Layer**
H. Nakano, P. H. Huang, H. Mimaki, J. Yamauchi, *Hosei University, Japan*
- 14:10 141.3 **A Hybrid Antenna Element for Dual-Band Applications**
C. B. Ravipati, *Applied EM, Inc., USA*; A. I. Zaghloul, *Virginia Polytechnic Institute and State University, USA*
- 14:30 141.4 **A Broad Band Printed Bow-Tie Antenna with a Simplified Feed**
G. Zheng, A. A. Kishk, A. B. Yakovlev, A. W. Glisson, *The University of Mississippi, USA*
- 14:50 141.5 **Model and Results for Single Mode PIFA Antenna**
R. G. Vaughan, *Simon Fraser University, Canada*
- 15:10 141.6 **Small Patch Antenna with Short-Circuited Elements**
H. Wong, K. M. Luk, *City University of Hong Kong, China*
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Session 142. Integral Equation Techniques

Thursday, June 24 13:25-17:30

AP

San Carlos II

Co-Chairs: Stephen Gedney, *University of Kentucky, USA*
William Wood, *Air Force Institute of Technology, USA*

- 13:25 Opening Remarks
- 13:30 142.1 **EM Scattering from Bodies of Revolution Using the Locally Corrected Nystrom Method**
W. D. Wood, A. W. Wood, J. L. Fleming, *Air Force Institute of Technology, USA*
- 13:50 142.2 **A Study of IE Formulations in Near-Resonance Decoupling Approach (NRDA) for Cavity Scattering Problems**
C. Yu, C.-C. Lu, C. Luo, *University of Kentucky, USA*
- 14:10 142.3 **Mixed-Order Basis Functions for the Locally-Corrected Nyström Method**
S. D. Gedney, A. Zhu, C. Lu, *University of Kentucky, USA*
- 14:30 142.4 **On the Continuity Condition for the Higher-Order VSIE-MoM Formulation**
O. S. Kim¹, E. Joergensen², P. Meincke¹, O. Breinbjerg¹
¹*Technical University of Denmark, Denmark*; ²*TICRA, Denmark*
- 14:50 142.5 **Curl-Conforming MFIE in the Analysis of Perfectly Conducting Sharply-Edged Objects**
E. Ubeda, J. M. Rius, *Universitat Politècnica de Catalunya (UPC), Spain*
- 15:10 142.6 **Full-wave Characterization of Planar EBG Structures by the MoM/BI-RME Method**
M. Bozzi, S. Germani, L. Minelli, L. Perregiani, *University of Pavia, Italy*; P. de Maagt, *European Space Agency (ESTEC), The Netherlands*
- 15:30 142.7 **Problem-Matched Basis Functions for Microstrip Coupled Slot Antennas based on Transmission Line Green Functions**
S. Bruni, N. Llombart, A. Neto, G. Gerini, *TNO Physics and Electronics Laboratory, The Netherlands*; S. Maci, *University of Siena, Italy*
- 15:50 142.8 **Accurate Evaluation of the Galerkin's Testing Integrals for the Triangular-type Junction Basis Function**
J. M. Taboada, *Universidad de Extremadura, Spain*; J. L. Rodriguez, F. Obelleiro, *Universidad de Vigo, Spain*
- 16:10 142.9 **An Algorithm for the Nonlinear Eigenvalue Problem with Application to the Computation of the Interior Resonances of EFIE**
G. Angiulli, *Univ. Mediterranea, Italy*; F. Angiulli, *CNR, Italy*; G. Di Massa, *Univ. della CALABRIA, Italy*
- 16:30 142.10 **The Thin Wire Model for Thick and Highly Curved Wire Structures**
A. Heldring, J. M. Rius, *Universitat Politècnica de Catalunya, Spain*
- 16:50 142.11 **Recursive Relations in Accurate Computation of Green's Function for Cylindrical Stratified Media**
J. Sun¹, L.-W. Li^{1,2}, E.-P. Li³, M.-S. Leong¹
¹*National University of Singapore, Singapore*; ²*Singapore-MIT Alliance, Singapore*; ³*Institute of High Performance Computing, Singapore*
- 17:10 142.12 **Numerical Implementations for Calculating the Load Current of an Infinitesimally Thin Cylindrical Dipole**
E. S. Li, *National Chi Nan University, Taiwan*; J.-C. Cheng, *Chang-Gung University, Taiwan*

Session 143. Phased Array Design & Analysis

Thursday, June 24 13:25-17:30

AP

San Carlos III

Co-Chairs: Allan Jablon, *Johns Hopkins University APL, USA*
Donald Wilton, *University of Houston, USA*

- 13:25 Opening Remarks
- 13:30 143.1 **An Interpolation Technique for Time-Domain Phased Array Measurements**
H. M. Aumann, K. A. Tuttle, F. G. Willwerth, *MIT Lincoln Laboratory, USA*

- 13:50 143.2 **Simultaneous Far-Field and Aperture Phase Measurements of a 25 Element Coupled Oscillator Based Phased Array**
R. J. Pogorzelski, *California Institute of Technology, USA*
- 14:10 143.3 **Alternative Approaches for Minimizing Surface Wave Effects on Phased Array Antennas**
A. E. Fathy, *The University of Tennessee, USA*; M. ElSherbiny, *Advanced Antenna Technologies, Inc., USA*
- 14:30 143.4 **Optimal Number of Array Faces for Active Phased Array Radars**
A. R. Jablon, A. K. Agrawal, *Johns Hopkins University Applied Physics Laboratory, USA*
- 14:50 143.5 **Hybrid GSM/FE Analysis of Phased Arrays of Arbitrarily Shaped Apertures Fed by Rectangular Waveguides**
P. Grassi¹, A. Monorchio¹, R. Mittra², G. Manara¹
¹*University of Pisa, Italy*; ²*Pennsylvania State Univ., USA*
- 15:10 143.6 **Near-Field Null Constraints in Array Far-Field Synthesis**
R. Vescovo, *Università di Trieste, Italy*
- 15:30 143.7 **Semi-Active Conformal Array for ESA's GAIA Mission**
A. Martin Polegre¹, G. Caille², L. Boyer², A. Roederer¹
¹*European Space Agency, Netherlands*; ²*Alcatel Space, France*
- 15:50 143.8 **Mobile Phased Array Antenna Design with Low Sidelobe Pattern by Genetic Algorithm**
S. H. Son, U. H. Park, K. H. Lee, S. I. Jeon, *ETRI, Korea*
- 16:10 143.9 **A Parametric Analysis of Finite Phased Arrays of Printed Dipoles on Large Circular Cylinders and Comparisons with the Planar Case**
V. B. Erturk, B. Guner, O. Bakir, *Bilkent University, Turkey*
- 16:30 143.10 **Eliminating Pointing Errors in Phased Arrays with Controlling Phase Errors by Random Series Method**
W. Shen, X. Zhou, *Shanghai Jiaotong University, China*
- 16:50 143.11 **Suppression of Quantization Sidelobes of Phased Array**
W. Shen, X. Zhou, *Shanghai Jiaotong University, China*
- 17:10 143.12 **Mutual Coupling Compensation in Small Phased Array Antennas**
S. Sadat, C. Ghobadi, J. Nourinia, *Urmia University, Iran*

Session 144. Printed Antennas with Novel Shapes

Thursday, June 24 13:25-15:30

AP

San Carlos IV

Co-Chairs: Keith Snyder, *Northrup Grumman Mission Systems, USA*
Trevor Bird, *Macquarie University and CSIRO ICT Centre, Australia*

- 13:25 Opening Remarks
- 13:30 144.1 **Wideband Half U-Slot Patch Antennas with Shorting Pin and Shorting Wall**
R. Chair¹, K. F. Lee¹, C. L. Mak², K. M. Luk², A. A. Kishk¹
¹*University of Mississippi, USA*; ²*City University of Hong Kong, China*
- 13:50 144.2 **Compensating for Non-Uniform Phase Distribution In a Spatial Power Combiner Formed by Hard Horns and Trays of Uniplanar Quasi-Yagi Antennas**
F.-C. E. Tsai, M. E. Bialkowski, *University of Queensland, Australia*
- 14:10 144.3 **An X-Band Tray-Type Spatial Power Combiner Using Uniplanar Quasi-Yagi Antennas**
F.-C. E. Tsai, M. E. Bialkowski, *University of Queensland, Australia*
- 14:30 144.4 **High Gain Multi-Section Endfire Antenna**
K. Leong, C.-J. Lee, T. Itoh, *UCLA, USA*
- 14:50 144.5 **A Small Planar Inverted F Antenna with Capacitive and Inductive Loading**
S. Schulteis, C. Waldschmidt, C. Kuhnert, W. Wiesbeck, *Institut fuer Hoechsfrequenztechnik und Elektronik, Germany*
- 15:10 144.6 **Microstrip-Fed E-shaped Patch Antennas and Diversity Pairs for Wireless Communications**
Y. Ge¹, K. P. Esselle¹, T. S. Bird^{1,2}
¹*Macquarie University, Australia*; ²*CSIRO, Australia*

Session 145. Finite Elements in the Frequency and Time Domains

Thursday, June 24 13:25-17:30

AP/URSI B

Ferrante III

Co-Chairs: Andreas Cangellaris, *University of Illinois at Urbana-Champaign, USA*
Daniel A. White, *Lawrence Livermore National Laboratory, USA*

- 13:25 Opening Remarks
- 13:30 145.1 **Finite Element Modeling of Embedded Passives for System-On-Chip and System-In-Package Integrated Electronics**
H. Wu, A. C. Cangellaris, *University of Illinois at Urbana-Champaign, USA*
- 13:50 145.2 **An Evaluation of Error Estimators for P-Refinement with the Vector Finite Element Method**
G.-H. Park, A. F. Peterson, *Georgia Institute of Technology, USA*
- 14:10 145.3 **Assessing the Accuracy of Finite Element Formulations for Fine Details**
P. Barba, R. Sun, L. Kempel, B. Sharker, *Michigan State University, USA*
- 14:30 145.4 **On the Higher-Order Hexahedral Meshing for FEM in Electromagnetics**
B. M. Notaros, A. Ž. Ilić, M. M. Ilić, *University of Massachusetts Dartmouth, USA*
- 14:50 145.5 **Analysis of Chiral Grating Using Finite Element Method**
S. Vellakkumar, T. X. Wu, X. Yang, *University of Central Florida, USA*
- 15:10 145.6 **Analysis of 3D Eigenvalue Problems Based on a Spectral Element Method**
J.-H. Lee, Q. H. Liu, *Duke University, USA*
- 15:30 145.7 **An Numerical Scheme for Frontal Solution in Cooperation with Substructure Technique for 3D Electromagnetic Analysis**
Y. Zhao, *Nanjing Normal University, China*; K. Y. See, *Nanyang Technological University, Singapore*
- 15:50 145.8 **On the Use of Cubic Wavelet-like Functions in a Finite Element Time-Domain Algorithm**
E. Hutchcraft, R. K. Gordon, *University of Mississippi, USA*
- 16:10 145.9 **Application of Preconditioned Iterative Solvers to the Time-Domain Finite Element Method**
T. Rylander, M. M. Botha, J.-M. Jin, *University of Illinois at Urbana-Champaign, USA*
- 16:30 145.10 **A Time-Domain Finite Element Formulation for Periodic Structures**
L. E. R. Petersson, J.-M. Jin, *University of Illinois at Urbana-Champaign, USA*
- 16:50 145.11 **Non-Uniform Grid (NG) Algorithm for Fast Potential Evaluation**
A. Boag, B. Livshitz, *Tel Aviv University, Israel*

Session 146. Electromagnetic Scattering Analysis

Thursday, June 24 13:25-16:50

AP

Ferrante II

Co-Chairs: William Johnson, *Sandia National Laboratories, USA*
Kendall Casey, *SRI International*

- 13:25 Opening Remarks
- 13:30 146.1 **Full-Wave Analysis of a Class of Ray-Chaotic Cylindrical Geometries**
G. Castaldi, V. Galdi, I. M. Pinto, *University of Sannio, Italy*; L. B. Felsen, *Boston University, USA*
- 13:50 146.2 **Solution of Two-Part Scattering Problems via the Cross-Flux**
M. E. Gerwell, H. Ling, *The University of Texas at Austin, USA*; S. W. Lee, *SAIC/DEMACO, USA*
- 14:10 146.3 **A Super-Resolution Method for Extraction of Modal Responses in Wideband Data**
K. Naishadham, J. E. Piou, *MIT Lincoln Laboratory, USA*
- 14:30 146.4 **Enhanced Transmission Through Truncated Compound Periodic Arrays of Subwavelength Holes**
S. Li, V. Lomakin, E. Michielssen, *University of Illinois at Urbana-Champaign, USA*
- 14:50 146.5 **Analysis of the Electromagnetic Scattering by a Raindrop Using the Method of Auxiliary Sources**
S. A. Kanellopoulos, A. D. Panagopoulos, J. D. Kanellopoulos, *National Technical University of Athens, Greece*

- 15:10 146.6 **A New Multipole Approach for Scattering Problems**
L. Klinkenbusch, Computational Electromagnetics Group, Germany
- 15:30 146.7 **A High Frequency Integral Equation Method (HFIE) for Analyzing Electromagnetic Scattering from Large Faceted Bodies**
G. Tiberi, S. Rosace, A. Monorchio, G. Manara, University of Pisa, Italy; R. Mittra, Pennsylvania State Univ., USA
- 15:50 146.8 **The Shadow Boundary Integral Technique for Cassegrain Subreflectors**
A. Pippi¹, A. Caruso¹, M. Sabbadini², S. Maci¹
¹University of Siena, Italy; ²European Space Agency ESA-ESTEC, The Netherlands
- 16:10 146.9 **Scattering of an Arbitrary Shaped 3-D Chiral Object over Half Space**
X. Wang, Y.-B. Gan, L.-W. Li, National University of Singapore, Singapore
- 16:30 146.10 **Fast Solution of Scattering from 3D Coating Object by MLFMA with Diagonal Element Approximation Method**
H. Jun, N. Z. Ping, L. Lin, W. Jun, Z. G. Xian, University of Electronic Science and Technology of China, China

Session 147. Novel Techniques for Transient Problems

Thursday, June 24 13:25-17:30

AP

Ferrante I

Co-Chairs: Costas Sarris, University of Toronto, Canada
Marc Kowalski, Stanford Linear Accelerator Center

- 13:25 Opening Remarks
- 13:30 147.1 **Two-Dimensional Transverse-Magnetic Time-Domain Scattering Using the Nyström Method and Green's Function Filtering**
R. A. Wildman, D. S. Weile, University of Delaware, USA
- 13:50 147.2 **A Robust Solution to Time Domain Integral Equations for Perfect Electric Conductors Using Loop-Tree Decomposition and Bandlimited Extrapolation**
G. Pisharody, D. S. Weile, University of Delaware, USA
- 14:10 147.3 **An Accurate Solution to Time Domain Integral Equations for Homogeneous Dielectric Bodies Using Loop-Tree Decomposition and Bandlimited Extrapolation**
G. Pisharody, D. S. Weile, University of Delaware, USA
- 14:30 147.4 **The Parallel Plane Wave Time Domain Algorithm-Accelerated Marching on in Time Solvers for Large-Scale Electromagnetic Scattering Problems**
N. Liu¹, M. Lu¹, B. Shanker², E. Michielssen¹
¹University of Illinois at Urbana-Champaign, USA; ²Michigan State University, USA
- 14:50 147.5 **A Hybrid Method of Moments-Marching on in Time Method for the Solution of Electromagnetic Scattering Problems**
A. Mohan, D. S. Weile, University of Delaware, USA
- 15:10 147.6 **Broadband Analysis of Electromagnetic Scattering from Dielectric Coated Conductors with Parallel TD-AIM**
A. E. Yilmaz, J.-M. Jin, E. Michielssen, University of Illinois at Urbana Champaign, USA
- 15:30 147.7 **Soft Source Generation in the Fourier PSTD Algorithm**
X. Gao¹, M. S. Mirotnik², D. W. Prather¹
¹University of Delaware, USA; ²The Catholic University of America, USA
- 15:50 147.8 **Optimal Pulse Penetration in Rocard-Powles-Debye Model Dielectrics Using the Brillouin Precursor**
K. E. Oughstun, University of Vermont, USA
- 16:10 147.9 **Efficient Calculation of Transient Fields in Multilayered Media**
V. Lomakin, E. Michielssen, University of Illinois at Urbana Champaign, USA
- 16:30 147.10 **General, Closed-Form Expressions for the Time-Domain Surface Impedances of a Homogeneous, Lossy Half-Space**
H.-Y. Pao, Lawrence Livermore National Laboratory, USA; Z. Zhu, S. L. Dvorak, University of Arizona, USA
- 16:50 147.11 **A Discrete-Time Solution to Wave Propagation in Time-Varying Media**
S.-K. Jeng, National Taiwan University, Taiwan

- 17:10 147.12 **Dispersion Analysis and Comparative Study of Coifman Scaling Function Based S-MRTD**
C. D. Sarris, A. Alighanbari, *University of Toronto, Canada*
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Session 148. Methods of RCS Analysis and Control

Thursday, June 24 13:25-15:30

AP

Colton

Chair: Kueichien Hill, *Air Force Research Laboratory Wright-Patterson AFB, USA*

- 13:25 Opening Remarks
- 13:30 148.1 **Performance of a Phase-Switched Screen Against a Pulse Compression Radar System**
B. Chambers, A. Melnikov, A. Tennant, *University of Sheffield, UK*
- 13:50 148.2 **RCS Controllable CP Reflect-Array Surface**
V. Srinivasan, V. F. Fusco, *Queens University of Belfast, UK*
- 14:10 148.3 **Differential Phase Polarizer for RCS Control**
B. Subbarao, V. F. Fusco, *Queens University of Belfast, UK*
- 14:30 148.4 **Radar Cross Section of Discrete Self-Similar Objects Using a Recursive Electromagnetic Analysis**
D. Voyer, *Laboratoire d'Electronique len7, ENSEEIHT, France*
- 14:50 148.5 **RCS Analysis of the Reinforced Carbon-Carbon Tee-Seals as Potential "Flight Day 2" Candidates in Support of the Columbia Accident Investigation**
K. Hill, J. Gulick, B. Kent, *Air Force Research Laboratory, USA*; T. Van, *Mission Research Corporation, USA*
- 15:10 148.6 **Smart Obstacles in Time Dependent Electromagnetic Scattering**
F. Zirilli, *Università di Roma, Italy*

Session 149. Multi-Band/Wideband Technology

Thursday, June 24 13:25-17:30

AP

DeAnza III

Chair: Bob Dybdal, *The Aerospace Corporation, USA*

- 13:25 Opening Remarks
- 13:30 149.1 **Broadband Internal Antenna of Planar Monopole Type for Mobile Handsets**
Y. S. Shin, S. O. Park, *Informaion & Communications University, Korea*
- 13:50 149.2 **Dual and Wide Band Internal Planar Antenna for Wireless LAN**
H. Iwasaki, N. Tokairin, K. Tamakuma, *Shibaura Insitute of Technology, Japan*
- 14:10 149.3 **A Dual-Band Antenna for WLAN Applications by Double Rectangular Patch with 4-Bridges**
C. W. Jung, F. D. Flavis, *University of California at Irvine, USA*
- 14:30 149.4 **A Dual-Band Antenna for Wireless Communication Terminals**
P. Nepa, A. A. Serra, S. Marsico, G. Manara, *University of Pisa, Italy*
- 14:50 149.5 **Design of a Multi-Standard Antenna System for PCMCIA**
M. Martínez-Vázquez, O. Litschke, *IMST GmbH, Germany*
- 15:10 149.6 **A Multi-resonator Microstrip-fed Patch Antenna for Broadband Dual-band Operation**
M. C. Mukundatimana, T. A. Denidni, *INRS-EMT, Canada*
- 15:30 149.7 **F-Probe Fed Broadband Triangular Patch Antennas Mounted on a Finite Ground Plane**
A. C. Lepage, X. Begaud, *GET- Telecom Paris, France*; G. Le Ray, A. Sharaiha, *IETR, France*
- 15:50 149.8 **Triple Band Internal Antenna with a Novel Feeding Structure**
B. J. Jung¹, M.-J. Park¹, J. Byun², S. Han³, B. Lee¹
¹Kwangwoon University, Korea; ²Samsung Electronics Co., Ltd., Korea; ³INTOPS Co., Ltd., Korea
- 16:10 149.9 **A Dual Band Meandering Folded Loop Antenna**
B. Bai, Z. H. Feng, *Tsinghua University, China*

- 16:30 149.10 **Tunable and Dual-Band Rectangular Slot Ring Antenna**
I. Carrasquillo-Rivera, R. A. Rodríguez-Solis, J. G. Colom-Ustáriz, *University of Puerto Rico, Puerto Rico*
- 16:50 149.11 **Design of Narrow-Width Fermi Antenna with Circular Radiation Pattern**
H. Sato, K. Sawaya, Y. Wagatsuma, K. Mizuno, *Tohoku University, Japan*
- 17:10 149.12 **A Wide Bandwidth Monopole Antenna using a Human Body as a Ground Plane**
T. Fukasawa, M. Ohtsuka, Y. Sunahara, S. Makino, *Mitsubishi Electric Corporation, Japan*

Session 150. Photonics in Antenna Systems

Thursday, June 24 13:25-15:10

AP

DeAnza II

Co-Chairs: Aly Fathy, *University of Tennessee - Knoxville, USA*
Omar Ramahi, *University of Maryland, USA*

- 13:25 Opening Remarks
- 13:30 150.1 **Computation of Green's Function for Finite-Size Photonic Crystals by Boundary Element Method**
F. Seydou, O. M. Ramahi, R. Duraiswami, T. Seppanen, *University of Oulu, Finland*
- 13:50 150.2 **Loss Compensated Photonic True-time Delay for Phased-Array Antenna**
Y. Chen, K. Wu, F. Zhao, *Omega Optics, Inc., USA*; R. Chen, *The Univ. of Texas at Austin, USA*
- 14:10 150.3 **Improvement of Planar Antenna Efficiency When Integrated with a Millimetre-Wave Photonic Crystal**
G. W. Burns, I. G. Thayne, *University of Glasgow, Scotland*
- 14:30 150.4 **Considerations for a Photonic Beamformer using an LFM Waveform in Transmit**
R. Rotman, O. Raz, M. Tur, *Tel Aviv University, Israel*
- 14:50 150.5 **A 650 GHz Photonic Transmitter Design Using CPW-Fed Slot Antenna**
Y.-C. Yu, S.-Y. Chen, A.-S. Liu, R.-B. Wu, C.-K. Sun, *National Taiwan University, Taiwan*

Session 151. Dual Polarized Patch Antennas

Thursday, June 24 13:25-17:30

AP

DeAnza I

Co-Chairs: Carey Johnson, *U.S. Army Research Laboratory at Adelphi, MD, USA*
Richard Hodges, *Jet Propulsion Laboratory, USA*

- 13:25 Opening Remarks
- 13:30 151.1 **A Dual Polarized Aperture Coupled Microstrip Antenna with Active Switching**
C. M. Johnson, S. Weiss, *Army Research Laboratory, USA*; C. White, G. Wilkins, C. Scott, *Morgan State University, USA*
- 13:50 151.2 **Wideband Dual-Polarized Patch Antenna Array on Finite Cylinder**
H. W. Lai, C. L. Mak, K. M. Luk, *City University of Hong Kong, China*
- 14:10 151.3 **Dual Polarization Antenna Fed by a Dual Mode Substrate Integrated NRD-Guide**
U. Schmid, W. Menzel, *University of Ulm, Germany*; Y. Cassivi, K. Wu, *Poly-Grames Research Center, Canada*
- 14:30 151.4 **Optimization of Cross Polarization Characteristics for Dual-Polarized Patch Antennas**
K. Nishimoto, T. Fukasawa, M. Ohtsuka, S. Makino, *Mitsubishi Electric Corporation, Japan*
- 14:50 151.5 **Design of a Large Dual Polarized Ku Band Reflectarray for Space Borne Radar Altimeter**
R. E. Hodges, M. S. Zawadzki, *Jet Propulsion Laboratory, USA*
- 15:10 151.6 **Experimental Study on Diversity Performance of a Dual-Linear Polarization Stacked Microstrip Antenna Array**
T. S. P. See, Z. N. Chen, *Institute for Infocomm Research, Singapore*
- 15:30 151.7 **Isolation Enhancement of Dual Polarized L-Probe coupled Patch Antenna Arrays**
T. P. Wong, K. M. Luk, L. Deyun, *City University of Hong Kong, China*

- 15:50 151.8 **A Novel Feed System for Soil Moisture Spaceborne Radar:Dual-Frequency Dual-Polarized Stacked Patch Microstrip Array**
K. S. Kona, M. Manteghi, Y. Rahmat-Samii, *UCLA, USA*
- 16:10 151.9 **S Band Dual Polarized Antenna for DAB Application**
Y. P. Hong¹, J. M. Kim¹, S.-C. Jeong², D.-H. Kim², J.-G. Yook¹
¹*Yonsei University, Korea; ²Actipass Co. Ltd, Korea*
- 16:30 151.10 **Design of a Dual-Polarized L-Band Microstrip Antenna with High Level of Isolation for SAR Applications**
M. Bonadiman, R. Schildberg, J. C. S. Lacava, *Instituto Tecnológico de Aeronáutica - ITA, Brazil*
- 16:50 151.11 **Single-Feed Dual-Frequency Dual Polarized Microstrip Antenna with Hexagonal Slot**
S. Sy, R. K. Raj, A. R. Chandran, C. K. Aanandan, M. Pezholil, V. Kesavath, *Cochin University of Science and Technology, India*
- 17:10 151.12 **A Wide-Band Dual-Polarization Patch Antenna for Mobile Applications**
D. Zeidofsky, J. Zakhar, *Northern University, Bangladesh, Bangladesh*

Session 152. Antenna Optimization and Design

Thursday, June 24 13:25-17:30

AP

Bonsai I

Co-Chairs: P. L. Werner, *Pennsylvania State University, USA*
Peter Slettman, *Remec Inc., USA*

- 13:25 Opening Remarks
- 13:30 152.1 **Genetic Optimization of a Hybrid DISS Tx Antenna**
T. H. O'Donnell, R. J. Barton, T. W. Bullett, J. Hunter, S. R. Best, *Air Force Research Laboratory, USA*
- 13:50 152.2 **Moment Method Analysis and Genetic Algorithm Design of Shaped Beam Pillbox Antennas**
P. Slättman, J. R. Sanford, *REMEC, USA*
- 14:10 152.3 **Base Station Design for Sector Coverage Using a Genetic Algorithm with the Method of Moments**
D. B. Webb, *Andrew Corporation, USA*
- 14:30 152.4 **Automated Synthesis of a Printed Dipole Antenna with FD-TD and a Novel Artificial Neural Network**
H. J. Delgado, *Harris Corporation, USA*; M. H. Thursby, *Command Technologies Inc, USA*
- 14:50 152.5 **Miniature Multi-Band Whip Antennas Designed Using Genetic Algorithms with Application to Vehicular Communication Systems**
P. L. Werner, D. H. Werner, *Penn State University, USA*
- 15:10 152.6 **Genetic Algorithm Optimization of Some Novel Broadband and Multiband Microstrip Antennas**
T. G. Spence, D. H. Werner, R. D. Groff, *The Pennsylvania State University, USA*
- 15:30 152.7 **GA Design of Small Wire Antennas**
M. Fernandez Pantoja, F. Garcia Ruiz, A. Rubio Bretones, R. Gomez Martin, S. Gonzalez Garcia, *University of Granada, Spain*; J. M. Gonzalez Arbesu, J. Romeu, J. M. Rius, *University of Cataluña, Spain*; D. H. Werner, P. L. Werner, *Pennsylvania State University, USA*
- 15:50 152.8 **GA Optimization of Terminal Antennas by the Estimation of the Population Density of Probability using Dependency Trees**
F. J. Nunez, A. K. Skrjervik, *Ecole Polytechnique Federal de Lausanne, Switzerland*
- 16:10 152.9 **Dielectric Bead Loading for Control of Currents on Electrically Long Dipole Antennas**
S. A. Long, T. F. Kennedy, J. T. Williams, *University of Houston, USA*
- 16:30 152.10 **Genetically Optimized Fractile Microstrip Patch Antennas**
T. G. Spence, D. H. Werner, *The Pennsylvania State University, USA*
- 16:50 152.11 **Electromagnetic Optimization of a Patch Antenna over a Textured Substrate Using Total Least Squares**
B. E. Fischer, A. E. Yagle, *The University of Michigan, USA*; J. L. Volakis, *The Ohio State University, USA*
- 17:10 152.12 **Modeling and Optimization of Circularly-Polarized Patch Antennas Using the Lumped Element Equivalent Circuit Approach**
G. R. DeJean, M. M. Tentzeris, *Georgia Institute of Technology, USA*

Session 153. Time-Domain Numerical Methods

Thursday, June 24 13:25-17:30

URSI B

Bonsai II

Co-Chairs: Eric Michielssen, *University of Illinois at Urbana-Champaign, USA*
Nathan Champagne, *Louisiana Technical University, USA*

- 13:25 Opening Remarks
- 13:30 153.1 **Hybrid PO-PWTD Scheme for Analyzing Scattering from Deep Cavities**
G. Kobidze, B. Shanker, *Michigan State University, USA*; E. Michielssen, *University of Illinois, USA*
- 13:50 153.2 **Analysis of Transient Scattering from Multiregion Bodies Using a Closed Form Evaluation of Time Domain Fields and the PWTD Algorithm**
J. Yuan¹, M. Lu², B. Shanker¹, E. Michielssen²
¹*Michigan State University, USA*; ²*University of Illinois, USA*
- 14:10 153.3 **Fast Evaluation of Near-Field Contributions in a PWTD-Enhanced MOT Scheme for Lossy Media**
P. Jiang, E. Michielssen, *University of Illinois at Urbana-Champaign, USA*
- 14:30 153.4 **Towards an Implicit-Implicit ADI-FDTD Method**
M. A. Mohamed, M. Piket-May, E. F. Kuester, *University of Colorado, USA*; C. L. Holloway, *National Institute of Standards and Technology, USA*
- 14:50 153.5 **Analysis of Transient Electromagnetic Coupling into Platform-Mounted Cables Using the Time-Domain Adaptive Integral Method**
H. Bagci, A. E. Yilmaz, A. C. Cangellaris, E. Michielssen, *University of Illinois at Urbana-Champaign, USA*
- 15:10 153.6 **An Embedded Boundary Method to Eliminate the ADI-FDTD Staircasing Error**
M. Chai, Q. H. Liu, *Duke University, USA*
- 15:30 153.7 **A New Pseudospectral Time-Domain (PSTD) Algorithm Based on Discontinuous Galerkin Method (DGM) and Hexahedral Elements**
G. Zhao, Q. H. Liu, *Duke University, USA*
- 15:50 153.8 **A 3D Spectral Discontinuous Galerkin Methods with Hybrid Elements**
T. Xiao, Q. H. Liu, *Duke University, USA*
- 16:10 153.9 **An Efficient and Flexible Pseudospectral Method for Maxwell's Equations**
T. Xiao, Q. H. Liu, *Duke University, USA*
- 16:30 153.10 **Nystrom Discretization of Time-Domain Integral Equations Using a Filtered Green's Function and Predictor/Corrector**
R. A. Wildman, D. S. Weile, *University of Delaware, USA*
- 16:50 153.11 **Comparison of the SBTD with the FDTD and Other Finite-Difference Time-Domain Methods**
G. W. Pan, S. Ogurtzov, *Arizona State University, USA*
- 17:10 153.12 **The Method of Auxiliary Sources (MAS) for Three Dimensional Time Domain Scattering Analysis**
J. Lee, S. Nam, *Seoul National University, Korea*

Session 154. Random Media, Rough Surfaces and Chaos

Thursday, June 24 13:25-17:30

AP/URSI B

Bonsai III

Co-Chairs: Shira Broschat, *Washington State University, USA*
Akira Ishimaru, *University of Washington, USA*

- 13:25 Opening Remarks
- 13:30 154.1 **Multiple Scattering Effects on Radar Cross Section (RCS) of Objects in Random Media Including Backscattering Enhancement and Shower Curtain Effects**
A. Ishimaru, S. Jaruwanatanadilok, Y. Kuga, *University of Washington, USA*
- 13:50 154.2 **On the Stochastic Radiative Transfer in a Discrete Random Medium**
M. A. Karam, *Northrop Grumman, USA*

- 14:10 154.3 **The Enhanced SSA for Rough Surface Scattering**
S. L. Broschat, *Washington State University, USA*
- 14:30 154.4 **Frame-Based Gaussian Beams Modeling of Rough Surface Scattering in Complicated Media**
G. Gordon, E. Heyman, *Tel Aviv University, Israel*; R. Mazar, *Ben-Gurion University, Israel*
- 14:50 154.5 **Scattering of Electromagnetic Waves from Three-Layer Rough Surfaces Using the Small Perturbation Method**
A. Tabatabaeenejad, M. Moghaddam, *The University of Michigan, USA*
- 15:10 154.6 **Numerical Methods for Analysis of EM Scattering from an Electrically Large Ocean Surface**
Z. Zhao, L. Li, L. Carin, *Duke University, USA*
- 15:30 154.7 **Demonstration of Time Reversal Methods in a Multi-Path Environment**
K. Sarabandi, I.-S. Koh, M. D. Casciato, *The University of Michigan, USA*
- 15:50 154.8 **Scattering from a Target on a Rough Sea Surface Using a Decoupled Approach**
R. J. Burkholder, K. Jamil, *The Ohio State University, USA*
- 16:10 154.9 **A Closed Form Solution of the Helmholtz Equation for a Class of Chaotic Resonators**
F. Seydou, O. M. Ramahi, *University of Oulu, Finland*
- 16:30 154.10 **Fast and Exact Method for Calculating Bistatic Scattering from Periodic Rough Surfaces**
D. P. Kasilingam, *University of Massachusetts Dartmouth, USA*
- 16:50 154.11 **Application of Optimization Methods for Modeling of Nonlinear Electromagnetic Wave Interaction with Random Discrete Media**
V. G. Spitsyn, Y. R. Tsoy, I. V. Fedotov, *Tomsk Polytechnic University, Russia*
- 17:10 154.12 **Experimental Study of Meteorological Parameters Variation Using HF-Signal During Solar Proton Events**
Y. V. Goncharenko, V. V. Guntik, F. V. Kivva, *Institute for Radiophysics and Electronics NAS of Ukraine, Ukraine*

Session 155. Biological Effects & Material Characterization

Thursday, June 24 13:25-15:30

URSI A

Ironwood

Co-Chairs: William Davis, *Virginia Polytechnic Institute and State University, USA*
Susan Hagness, *University of Wisconsin, USA*

- 13:25 Opening Remarks
- 13:30 155.1 **Magnetic Resonant Imaging RF Coil Analysis and Design**
X. Xie, G. W. Pan, *Arizona State University, USA*
- 13:50 155.2 **FDTD Analysis of Several Broadband Antennas Close to Human Tissues**
Q. Han, M. Popovic, *McGill University, Canada*
- 14:10 155.3 **Finite Element Modeling of a Radio-Frequency Phased Array Designed for Hyperthermia Cancer Treatments in the Intact Breast**
S. Soto-Cabán, L. Kempel, R. J. McGough, *Michigan State University, USA*; T. V. Samulski, *Duke University Medical Center, USA*
- 14:30 155.4 **FDTD Analysis of a Gigahertz TEM Cell for Ultrawideband Pulse Exposure Studies of Biological Specimens**
Z. Ji, S. C. Hagness, J. H. Booske, *UW-Madison, USA*; S. Mathur, *McKesson BioServices, USA*; M. Meltz, *University of Texas Health Science Center, USA*
- 14:50 155.5 **Error Estimates of Stepped Waveguide Material Characterization Measurements**
S. P. Dorey, M. J. Havrilla, W. P. Baker, *Air Force Institute of Technology, USA*; D. P. Nyquist, E. J. Rothwell, *Michigan State University, USA*
- 15:10 155.6 **Eliminating Signal Processing Artifacts Due to FFT in the Analysis of Broadband Signal Using the Matrix Pencil Method**
T. K. Sarkar, S. Burintramart, *Syracuse University, USA*

Session 156. Efficient Analysis of Electrically Large Structures

Thursday, June 24 13:25-15:30

AP

Cottonwood

Co-Chairs: Robert J. Burkhader, *The Ohio State University, USA*
C.J. Reddy, *Applied EM, Inc., USA*

- 13:25 Opening Remarks
- 13:30 156.1 **Asymptotic Phasefront Extraction Applied to Iterative Physical Optics for Electrically Large Multi-Bounce Problems**
R. J. Burkholder, P. H. Pathak, *The Ohio State University, USA*; C. J. Reddy, *Applied EM, Inc., USA*
- 13:50 156.2 **An Improved Method to Evaluate the Slow Fading Signal over Electrically Massive Scatterers**
E. P. O Nuallain, *Trinity College Dublin, Ireland*
- 14:10 156.3 **Hierarchical Conjugate Gradient Method Applied to MoM Analysis of Electrically Large Structures**
B. M. Kolundzija, *University of Belgrade, Serbia and Montenegro*; D. S. Sumic, *WIPL-D Ltd., Serbia and Montenegro*
- 14:30 156.4 **Sub-Entire-Domain Basis Function Method for Large-Scale Periodic Structures**
T. J. Cui, W. B. Lu, Z. G. Qian, X. X. Yin, W. Hong, *Southeast University, China*
- 14:50 156.5 **Fast Algorithms for Large-Scale Periodic Structures**
W. B. Lu, T. J. Cui, Z. G. Qian, X. X. Yin, W. Hong, *Southeast University, China*
- 15:10 156.6 **Efficient Full-wave Analysis of Large Radial-Line Slot-Array Antennas Loaded With Parasitic Strips**
J. I. Herranz-Herruzo, A. valero-Nogueira, M. Ferrando-Bataller, M. Cabedo-Fabres, *Universidad Politecnica de Valencia, Spain*

Session 157. CPW - Fed Slots

Thursday, June 24 15:30-17:10

AP

San Carlos I

Chair: Eric Kohls, *Windermere IT Systems, USA*

- 15:30 157.1 **A Broadband CPW-Fed Non-Uniform Folded-Slot Antenna with a Pair of Matching Slots**
S. M. Deng, *TA-HWA Institute of Technology, Taiwan*; C. W. Chiu, *National I-Lan University, Taiwan*; T. M. Lai, *National Taiwan University, Taiwan*; T. W. Chen, *Industrial Technology Research Institute, Taiwan*
- 15:50 157.2 **Experimental Investigation of a Novel Bow-Tie Slot Antenna for Wideband Wireless Applications at 5.8 GHz**
M. Nedil, T. A. Denidni, *Université de Québec, Canada*; L. Talbi, *University of Quebec - Outaouais, Canada*
- 16:10 157.3 **Wideband Triangle Slot Antenna with Tuning Stub**
A. Z. Elsherbeni, A. A. Eldek, C. E. Smith, *The University of Mississippi, USA*
- 16:30 157.4 **A Broadband CPW-Fed Bow-Tie Slot Antenna**
J.-W. Niu, S.-S. Zhong, *Shanghai University, China*
- 16:50 157.5 **Studies of a CPW-Fed Dual-Frequency Annular-Ring Slot Antenna**
J.-S. Chen, *Cheng Shiu University, Taiwan*

Session 158. Planar Structures & Remote Measurements

Thursday, June 24 15:30-17:30

AP/URSI A

San Carlos IV

Co-Chairs: Sedki Riad, *Virginia Polytechnic Institute and State University, USA*
Aly Fathy, *University of Tennessee - Knoxville, USA*

- 15:30 158.1 **Effect of Ground Plane Size on the Performance of a Class of Microstrip Antennas on Microwave**

Substrates

V. Natarajan, E. A. Chettiar, D. Chatterjee, *University of Missouri Kansas City (UMKC), USA*

- 15:50 158.2 **Remote Microwave Measurement System for Pipeline Integrity Monitoring**

S. Vellakkumar, T. X. Wu, *University of Central Florida, USA*; M. Auerbach, C. Lochman, L. Mertens, *EMTEL Corporation, USA*

- 16:10 158.3 **Effect of Inner Ground Plane on the Isolation between Tx and Rx Band in SAW Duplexer Package**

H. Dong, T. X. Wu, *University of Central Florida, USA*; K. S. Cheema, B. P. Abbott, *SAWTEK, Inc., USA*

- 16:30 158.4 **Accurate Modeling and Design of Printed Circuit Testing Board for SAW Duplexer Measurement**

H. Dong, T. X. Wu, *University of Central Florida, USA*; K. S. Cheema, B. P. Abbott, *SAWTEK, Inc., USA*

- 16:50 158.5 **Analytical Modeling of Planar Coil Inductor on a Ground Plane Using a Segmentation Technique**

M. Yvanoff, J. Venkataraman, *Rochester Institute of Technology, USA*

- 17:10 158.6 **Capacitive-Inductive-Capacitive Configurations in a Strip Line for Multi-Layered BPF Applications**

Y. Horii, *Kansai University, Japan*

Session 159. High-Frequency RCS Computation

Thursday, June 24 15:30-17:30

AP

Colton

Co-Chairs: Hao Ling, *University of Texas, USA*
Robert Kipp, *SAIC Demaco, USA*

- 15:30 159.1 **Ray-Tracing Acceleration Techniques to Compute RCS of Complex Targets**

L. Lozano, M. I. Hernández, C. Romera, I. González, F. Saez de Adana, F. Cátedra, *Escuela Politecnica. Universidad de Alcalá, Spain*

- 15:50 159.2 **Acceleration Technique Based on Ray-Tracing to Analyze the RCS in Open Cavities**

O. Gutierrez, F. M. Saez de Adana, M. F. Catedra, P. Perez, *Universidad de Alcalá, Spain*

- 16:10 159.3 **Radar Cross Section Analysis Considering Multi-Reflection Inside a Radome Using SBR Method**

S. Kuroda, Y. Inasawa, Y. Konishi, S. Makino, *Mitsubishi Electric Corporation Information Technology R&D Center, Japan*

- 16:30 159.4 **On the Application of PO Green's Function for the Prediction of the Field Scattered by Large Bodies**

M. Albani, *University of Messina, Italy*; G. Meniconi, S. Maci, *University of Siena, Italy*

- 16:50 159.5 **A Line Integral Asymptotic Representation of the PO Radiation from NURBS Surfaces**

A. Pippi, S. Della Casa, S. Maci, *University of Siena, Italy*

- 17:10 159.6 **Parallel Implementation of a High Frequency Code for the Prediction of the RCS from Complex Targets Using the Parallel Virtual Machine**

M. Vespe, *University College London, UK*; S. Selleri, G. Pelosi, *University of Florence, Italy*

Session 160. Complex Media and Metamaterials

Thursday, June 24 15:30-17:30

AP/URSI B

DeAnza II

Co-Chairs: Sergei A. Tretyakov, *Helsinki University of Technology, Finland*
John L. Volakis, *The Ohio State University, USA*

- 15:30 160.1 **FDTD Simulation of Scattering from Objects with Double-Negative Material Characteristics**

J. F. Ma, W. Yu, T. Su, R. Mittra, *Penn State University, USA*

- 15:50 160.2 **Modeling High Contrast Metamaterials with Variable Higher Order Basis Functions**

B. C. Usner, K. Sertel, J. L. Volakis, *The Ohio State University, USA*

- 16:10 160.3 **Computing Bulk Effective Permittivity from Thin Film Simulations**

K. W. Whites, J. Preheim, *South Dakota School of Mines and Technology, USA*

- 16:30 160.4 **Averaged Transition Conditions for Electromagnetic Fields at a Uniform Periodic Distribution of Small Scatters**
M. A. Mohamed¹, E. F. Kuester¹, D. Filipovic¹, C. L. Holloway², M. Piket-May¹
¹*University of Colorado, USA;* ²*National Institute of Standards and Technology, USA*
- 16:50 160.5 **Wave Propagation Through Chiral Periodic Structure with Arbitrary Shape**
X. Yang, T. X. Wu, *University of Central Florida, USA*
- 17:10 160.6 **Research on EBG Structure Consisting of Bi-Anisotropic Media**
L. G. Zheng, W. X. Zhang, *Southeast University, China*

Session 161. Application of Time Domain Methods

Thursday, June 24 15:30-17:30

AP

Ironwood

Co-Chairs: Mingyu Lu, *University of Illinois at Urbana-Champaign, USA*
J. Scott Tyo, *University of New Mexico, USA*

- 15:30 161.1 **A Local Filtering Scheme for FMM/PWTD Algorithms**
M. Lu, E. Michielssen, *University of Illinois at Urbana-Champaign, USA*
- 15:50 161.2 **FDTD Analysis of Resistively Loaded Broadband "Dark Eyes" Antenna**
H. Kanj, M. Popović, *McGill University, Canada*
- 16:10 161.3 **Multi-Resolution Analysis of Thin Wire Scatterer by Time-Domain Integral Equation Method**
Z. Zhou, J. S. Tyo, *University of New Mexico, USA*
- 16:30 161.4 **A Time-Marching Scheme for Analyzing Transient Scattering from Nonplanar Doubly Periodic Structures**
N.-W. Chen¹, M. Lu¹, P. Jiang¹, F. Capolino², B. Shanker³, E. Michielssen¹
¹*University of Illinois at Urbana-Champaign, USA;* ²*University of Sienna, Italy;* ³*Michigan State University, USA*
- 16:50 161.5 **A New Consistent Technique for the Construction of Symmetric Constitutive Matrices for Generalized Time Domain Algorithms**
M. Marrone, R. Mittra, *Pennsylvania State University, USA*
- 17:10 161.6 **FDTD Verification on an Improved Virtual Transmission-Line Conversion Model of Open-Ended Coaxial Probe**
Y.-S. Jo, S.-Y. Kim, *Korea Institute of Science and Technology, Korea*

Session 162. Scattering from Particles, Slabs and Apertures

Thursday, June 24 15:30-17:30

AP/URSI B

Cottonwood

Co-Chairs: Glenn S. Smith, *Georgia Institute of Technology, USA*
Robert H. MacPhie, *University of Waterloo, USA*

- 15:30 162.1 **Scattering of a Plane Wave by Two Strongly Coalescing Perfectly Conducting Spheres**
R. H. MacPhie, C. Man, *University of Waterloo, Canada*
- 15:50 162.2 **Analytical and Numerical Investigation of Forward and Inverse Problems of Light Scattering by Irregularly-Shaped Particles**
X. Li, Z. Chen, J. Gong, A. Taflove, V. Backman, *Northwestern University, USA*
- 16:10 162.3 **Transmission of an Evanescent Wave Through a Subwavelength Aperture in a PEC Screen**
L. E. R. Petersson, G. S. Smith, *Georgia Institute of Technology, USA*
- 16:30 162.4 **An Approximate Solution for Scattering by Thin Dielectric Objects**
I.-S. Koh, K. Sarabandi, *The University of Michigan, USA*
- 16:50 162.5 **A New Uniform Solution for Scattering by Thin Dielectric Strips: TM Wave Incidence**
I.-S. Koh, K. Sarabandi, *The University of Michigan, USA*
- 17:10 162.6 **Numerical Analysis of Multiple Scattering from Nonspherical Objects**
M. Kawano, *Kumamoto National College of Technology, Japan;* H. Ikuno, *Kumamoto University, Japan*

